AMERICAN
JOURNAL OF SURGERY

VOL. XXVII. APRIL, 1913. No. 4

RENAL LITHIASIS.*

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Calculus formation in the kidney must be considered as a symptom, or better, an end-product of some abnormal process taking place or having taken place within the body.

To facilitate description, calculi are designated as primary or secondary according to the probability of tracing their origin.

The term secondary is applied to those calculi which can be definitely proven to be dependent for their causation upon bacterial invasion of the kidney.

The causation of primary stones, however, is still a matter of controversy, even though fifty years have elapsed since the theory of mere precipitation and agglutination as the causative factors was discarded, because of Rainey's description of the process of "molecular coalescence." His theory was that, "when two saline solutions which are calculated to produce an insoluble salt by decomposition, are allowed to mix gradually through the intervention of a colloid medium such as albumen, a small, firm laminated body is developed instead of crystalline matter, by the union of nascent salt with colloid" (Sondern).

These views were later supported by Vandyke, Carter and Ebstein, who explained the presence of colloid in the urine by any temporary renal disorder or injury to the renal epithelium by irritation of crystals contained in the urine.

In more recent years, however, Aschoff has proven that uric acid may be deposited in the kidney in granular form without injury to the epithelium.

Kleinschmidt, in his recent book, corroborates Aschoff's views by observations derived from experimental work upon animals. These experiments might seem to discredit the necessity for the presence of colloid material in the formation of calculi and exemplify the possibility of scientists proving a question both ways in the laboratory.

The uric acid infarcts present at birth may be the starting point of the calculus of adult life, or any infectious disease giving rise to excessive excretion of uric acid may produce a minute concretion which may eventually become of surgical importance.

Whether an "irreversible colloid" is an absolute necessity to the formation of renal calculus or not is a problem which must be left to the experimental laboratory for final solution.

Irrespective of their origin, renal calculi, from a treatment viewpoint, may be regarded as aseptic or septic according to the presence of bacterial inflammation in the kidney: primary calculi representing the aseptic class and secondary the septic.

The aseptic stage begins with irritation of the kidney, due to the passage of urine loaded with uric acid or calcium oxalate crystals, continues with the deposit of these crystals in calculous formation, and the production of catarrhal or interstitial changes in the kidney, and merges into the septic stage when hematogenous infection has taken place. These changes may be insidious and years may elapse before the gamut is run, but the rule is a progressive destruction of the kidney through interstitial changes or by suppuration.

The so-called classic symptoms of renal calculus —hematuria, renal colic and fixed pain—are so often absent as to be a negligible factor in arriving at an early diagnosis.

More minor symptoms must attract us to the kidneys as a possible seat of disease. Dr. L. G. Cole, from his vast experience in radiography, states that "most of the cases in which renal calculi have been demonstrated by *x*-ray have had no symptoms that were sufficiently characteristic to justify an operation, and only those that engage in the ureter or obstruct the pelvis, cause typical renal colic."

Such being the case, a patient complaining of slight pain in the back, tenderness over the kidney, a sense of weight in the back which is increased by jolting or the presence of even a trace of albumin, should suggest the suspicion of calculous disease and be given the benefit of a complete routine examination of the urinary tract. Many patients suffering from primary renal calculus have been first acquainted with this disorder by having been refused life insurance on account of slight albumin.

The following cases, taken at random from among those of my personal experience, will serve

* Read before the New York Academy of Medicine, Annual Meeting, January, 1913, as part of a symposium on Calculous Disease of the Genito-Urinary Tract.

to illustrate the various symptoms presented by patients suffering from renal calculi, as well as emphasize the truth of Cole's observation.

CASE 1. A youth of nineteen years presented himself for examination, having been refused life insurance on account of albuminuria. According to his story he had always enjoyed good health and never had had his attention directed to the kidneys as a possible seat of disease. *Urine examination* showed a trace of albumin and a few blood cells. *Radiography* revealed the presence of two calculi in the right kidney. This patient refused operation but has been under observation for four years. Repeated *x*-ray examination has failed to show any increase in the size of the calculi.

CASE II. A male, forty-five years of age, gave a history of symptoms referable to the urinary tract of but four weeks' duration. He was a shoemaker

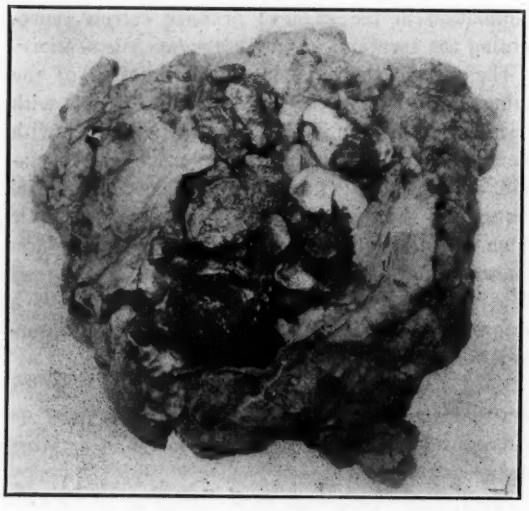

Plate 1. Extensive renal destruction by calculous disease.

and for fifteen years had not lost a day's work on account of illness.

Four weeks prior to his admission into the hospital a sharp pain had developed in the end of the penis, associated with increased frequency of urination. The urine also became very turbid. This pain lasted for ten days and disappeared. With the disappearance of the pain the intervals of urination became normal, but as the cloudy appearance of the urine persisted, he applied to the hospital for examination. Cystoscopic examination located the left kidney as the origin of the cloudy urine, which upon examination proved to be loaded with pus.

The right kidney excreted normal urine and twice the quantity of the left within the same interval of time.

Radiography of the left kidney showed it to contain numerous calculi; the right kidney showed increase in size only. At operation an almost wholly destroyed left kidney was removed. The extent of the destruction can be easily appreciated by a glance at plate No. 1, which is a photograph of the removed kidney and calculi.

The main point of interest is, that such extensive renal destruction may exist without the patient experiencing any more discomfort than has already been mentioned in the history.

CASE III. A man fifty years of age, suffering from persistent backache which had been present for a number of years. He was able to do laborious work and with exception of the "weak back" considered himself in excellent health. Urine examination was normal. The *x*-ray demonstrated a smooth uric acid calculus in the pelvis of the left kidney. Operation and removal of the stone resulted in relief of all symptoms.

CASE IV. Male, twenty years of age, a college athlete; half-back on a varsity team. Refused life

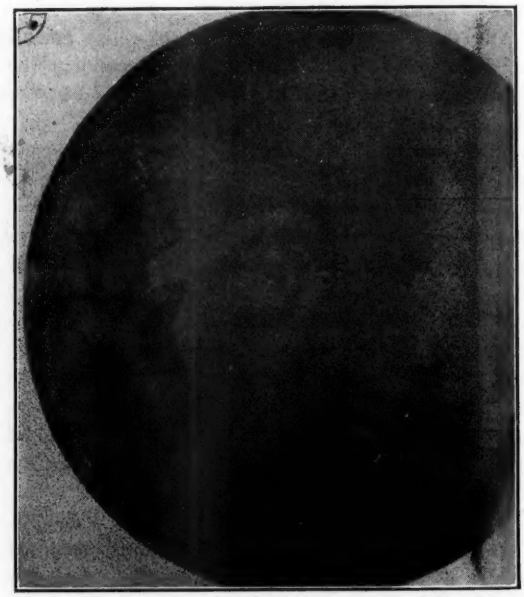

Plate 2. Argyrol-stained areas of renal tissue causing shadows simulating those of calculi.

insurance on account of albuminuria. Up to this he had believed himself a healthy man. Ureteral catheterization showed microscopic blood in urine drawn from the right kidney. Radiography demonstrated a smooth oval calculus in the renal pelvis. Operation confirmed radiography.

CASE V. This patient, a man thirty years of age, complained of pain over left kidney, hematuria and attacks of renal colic. Cystoscopic examination showed the blood to be present only in the urine from the right kidney. Radiography revealed calculi in both kidneys.

His physician had decided to operate for left renal calculus without the precaution of radiography, deeming the presence of the classic symptoms sufficient to establish diagnosis.

CASE VI. Male, twenty-eight years of age, admitted to the hospital with the following history:

Ten months previously, a left nephrectomy had

been performed for calculous kidney. The symptoms at that time were wholly referable to the left kidney. Radiographs had been made of the left kidney only.

Following the nephrectomy anuria had developed and the patient was critically ill for days. He recovered eventually and upon returning to work blood appeared in the urine. This had been present for three months before coming under my observation.

Cystoscopic examination showed that the blood originated from the remaining kidney.

X-ray demonstrated a calculus three inches in length by one in width in the kidney pelvis.

Pyelotomy and removal of the calculus was followed by an uneventful convalescence.

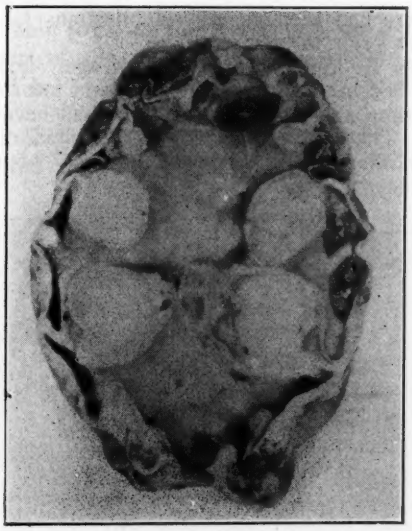

Plate 3. Surgical kidney with argyrol-stained areas.

These two cases bring up the question of which kidney to attack first in bilateral calculous disease. The rule is to operate the less diseased kidney first, and the wisdom of such a procedure is well evidenced in reviewing the history just cited.

Following nephrectomy reflex anuria had developed and the patient was desperately ill, whereas the convalescence after pyelotomy in the remaining kidney was without incident.

Watson urged at the meeting of the International Association, in 1908, the view that there was no reason for leaving a calculus in one kidney when taking one from the organ of the opposite side, in any case of bilateral calculus, whether the patient has anuria or not. He can see no danger in removing the stones at the same time from both kidneys and, on the contrary, as he has just pointed out, can see wherein there can be very serious danger in leaving a stone in the other kidney to be removed at a subsequent operation. It has been objected to this view that there is the danger of greater shock attending the simultaneous performance of the two operations, and the further danger of producing anuria when it is not already present because of the operative injury done to the two kidneys at the same time. He is not unaware of the fact that a temporary suspension of the urinary secretion may follow extensive operative interference with one or both kidneys, but this may also occur in operations entirely unconnected with the kidneys and in a few instances when they are not done upon any part of the urinary tract. Furthermore, there is but a very small number of cases in which fatal anuria has followed operation upon either one or both kidneys

Plate 4. Characteristic ring shadows cast by gall stones (from the *x*-ray laboratory of Dr. L. G. Cole).

as the result of the operative injury done to the organ, and still fewer—for but relatively few of them have been done on both kidneys at the same time—in which the simultaneously-performed bilateral operation has resulted in threatening or fatal anuria from the same cause.

The importance of always radiographing both kidneys is also impressively shown. With the newer renal function tests it is comparatively simple to arrive at a definite conclusion as to which kidney is the less damaged in bilateral calculous disease and it should be the method of election in determining this rather than relying upon the size or number of calculi as demonstrated by radiographs.

The following case summary is not an unusual example of the symptoms produced by renal calculus.

CASE VII. Male, twenty-two years. For two years prior to operation he had infrequent attacks

of pain over appendix, not radiating, a rise of temperature and vomiting. The diagnosis of catarrhal appendicitis had been made and removal of the appendix advised. When seen by me in consultation with his physician, the presence of a few blood cells in the urine pointed to a possible renal lesion as being responsible for these attacks. This an *x*-ray examination confirmed. With the removal of a calculus from the pelvis of the right kidney the attacks of simulated appendiceal pain ceased.

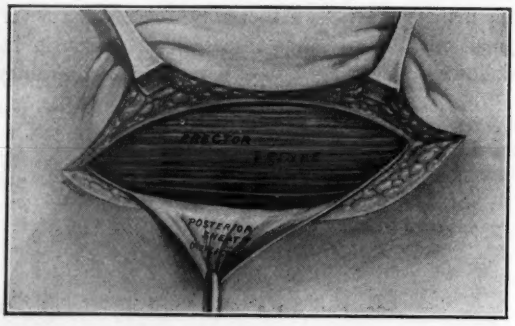

Plate 5. Posterior sheath of erector spinæ is opened and outer edge is reflected outward.

In considering the diagnosis of patients suffering from secondary calculus when infection is already present in the kidney, even more complexities arise.

A few histories of some of the more uncommon manifestations may be of interest.

CASE VIII. This case is included in this group to further emphasize the necessity in every instance of complete examination of both kidneys even though symptoms are referable to but one. A man fifty-five years of age presented himself with a history of pain over the right kidney, radiating into

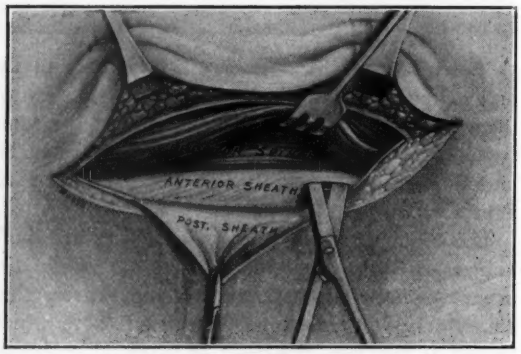

Plate 6. Belly of erector spinæ is retracted inward, exposing anterior layer of its sheath.

the testicle. The urine was loaded with pus. A radiogram had been taken of the right kidney only. A suspicious shadow made the diagnosis of right renal calculus seem probable. More detailed examination by ureteral catheterization demonstrated the pyuria originating from the left kidney, and subsequent radiographs the presence of a surgical left kidney.

Closer study of the radiographs of the right kidney seemed to prove the suspicious shadow to be an exostosis of the rib. Removal of the surgical kidney resulted in disappearance of all symptoms.

CASE IX. Female, forty-one years of age. History of intermittent pain over left kidney and pyuria for a period of five years.

The patient had been treated during this period with argyrol irrigations of the renal pelvis.

Radiogram showed shadows at either poles of the kidney, suspicious of calculi. See plate 2.

At operation, a wholly degenerated surgical kidney was removed. No calculi were present, but a number of argyrol stained areas in the organ were considered responsible for the shadows in the radiogram. See plate 3.

There had been no argyrol injections for some months prior to operation.

CASE X. Female, fifty years of age. Hysterectomy had been performed eight years prior to her admission and since that time she had never been well. The chief complaint was abdominal distress. No localized pain. She had lost fifty pounds in weight.

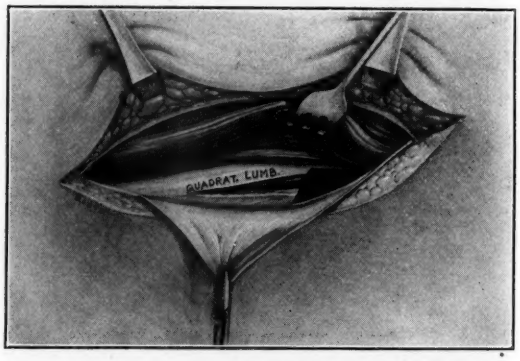

Plate 7. Incision in anterior sheath carried through a few fibers of quadratus, and lumbar fascia.

Physical examination revealed an enlarged right kidney. Ureteral catheterization drew urine loaded with pus from the right kidney and normal urine from the left. Radiogram showed an enormous calculus in the right kidney.

These histories point to the irregularity of symptoms complained of by these patients and the necessity of exercising great care in history taking and examination.

Radiography, of course, is the one means of diagnosis which has revolutionized this branch of surgery. By it the presence or absence of calculus in the kidney can be absolutely determined in ninety-five per cent of cases.

The only other calculus formation which might mask the diagnosis in this location would be gall stones. These are so characteristic in appearance, however, as to be readily differentiated. They present a peculiar ring-shaped shadow (see plate 4) which is cast by no other form of calculus.

In considering the surgery of nephrolithiasis, the classification of the disease into an aseptic and a septic stage is also convenient. The surgery of the aseptic stage comprises removal of the calculus or calculi, with or without drainage of the organ. The surgery of the septic stage requires the removal of the calculus or calculi with drainage, and frequently excision of the diseased kidney. The surgery of the aseptic stage is completed in one operation. The surgery of the septic stage may necessitate a primary operation for removal of the calculus and drainage of renal or perirenal pus collections, with secondary operation for removal of the kidney.

The incision of exposure of the kidney which I use differs from the usual vertical incision and has so many advantages in its favor that it is here described in detail:

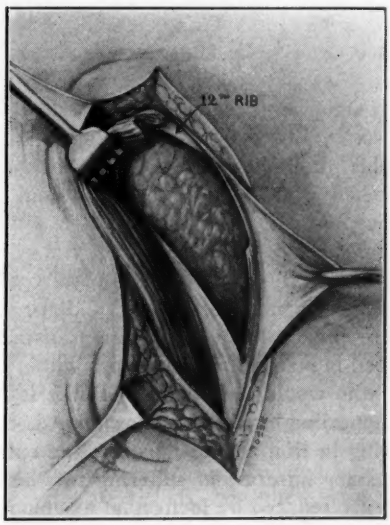

Plate 8. Last rib cleared of muscular attachments. Opening retracted.

A longitudinal incision commencing from just below the last rib and extending three inches downwards, is made over the belly of the erector spinæ (Diagram 1).

The posterior sheath of the erector spinæ is opened the whole length of the skin incision and the outer cut edge is reflected outward (Plate 5). The belly of the erector spinæ is retracted inward, exposing its anterior sheath (Plate 6).

Incision into the upper part of the anterior sheath opens up the posterior superior lumbar triangle just below the last rib. The last rib is then cleared of muscular and ligamentous attachments up to its head (Plate 7). The incision is enlarged downward by cutting a few fibers of the quadratus and lumbar fascia (Plate 8).

The chief advantages of such a method of kidney exposure are:

The ease with which a kidney can be brought out on the loin, the minimum of pull upon the pedicle when it is on the loin and the absence of danger of post-operative hernia forming in the wound.

The incision resembles the Kammerer incision for appendicitis, or opening the abdomen through the sheath of the rectus.

The kidney having been delivered on the loin, it is turned with its convex border facing outward. The posterior surface is thus exposed, and whether the calculi are in the pelvis or renal parenchyma, it is preferable to remove them through a posterior incision for two reasons: one, because there is less hemorrhage on account of the arrangements of the blood supply, the other, if drainage is necessary, its course is straight.

With the kidney on the loin, if the calculus or

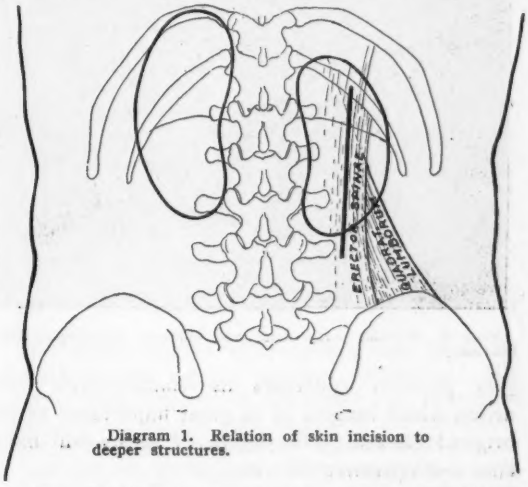

Diagram 1. Relation of skin incision to deeper structures.

calculi, whether in the pelvis or calices, can be removed through an incision in the pelvis, they should be so removed. We have learned the advantage of pyelotomy only in the past few years, the fear of a permanent fistula resulting from such an incision having been allayed by finding how readily wounds in the renal pelvis heal.

When opening the pelvis, the bloodvessels should be controlled by the assistant's finger, and the incision should be made at right angles to the kidney, and along the lower border to the pelvis; it should not extend into the ureter for fear of resulting stricture. If the calculus is felt before the pelvis is opened, it is well to steady it at the lower border of the pelvis, and open the pelvis as indicated by cutting down upon the stone. If the calculus is small or multiple or situated in the calices, the pelvis may be searched with the finger.

The calculi having been removed, the incision in the pelvis is closed with a few fine catgut sutures; the kidney is replaced, and the wound is closed with or without drainage, as the case may indicate. It has been the custom in the past to drain all such cases, but we find that many require no drainage, or the smallest rubber tissue drain, and only for a day or so. Removal of the calculus through the cortex necessitates incision over the stone on a line radiating from the pelvis, or just posterior to the lateral convex border parallel to the long axis of the kidney.

In the treatment of the septic stage, a more com-

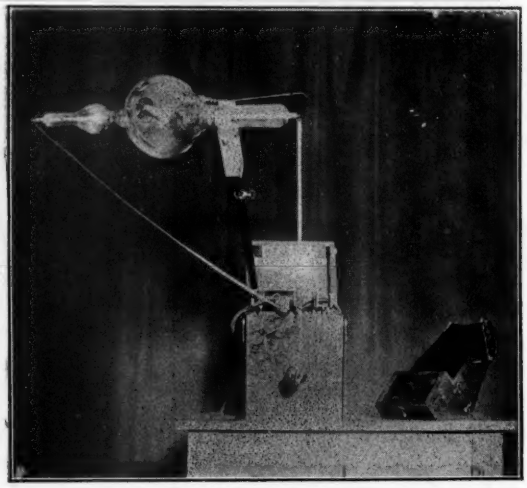

Plate 9. Portable *x*-ray outfit and author's right-angled-vision fluoroscope.

plex problem confronts us—complications have arisen which become of as great importance as the original disease. The degree of sepsis will influence our operative decision.

A mild pyelitis will require removal of the stone with drainage of the pelvis. Extensive suppuration with destruction of kidney tissue will indicate nephrectomy.

When operating for the removal of very small calculi, difficulty may sometimes be experienced in locating their position in the calices or parenchyma even after the kidney has been exposed. To accomplish removal of the calculi with the least possible injury to the kidney, I have made use of a portable *x*-ray apparatus and specially designed right-angled-vision fluoroscope to aid in their detection after the kidney has been exposed and brought out on the loin.

The *x*-ray outfit weighs only a few pounds and can be attached to an ordinary electric light socket without any special wiring. The flashing of the tube is controlled by the surgeon by means of a foot switch. The fluoroscope is covered with a sterile bag and suspended around the operator's neck or held by an assistant. With the use of this apparatus the possibility of any calculus escaping detection is obviated.

It requires but a moment to thus examine the exposed kidney fluoroscopically and, in doubtful cases, may be of the greatest value in the added sense of security which the surgeon has when he is sure that no calculus has been overlooked (Plate 9).

THREE KIDNEY-STONE CASES:

OBJECT LESSONS IN DIAGNOSIS.

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"Hope deferred maketh the heart sick."

What days and nights—and years—of such heart-sickness must have been experienced by the possessors of the kidneys shown in the accompanying illustrations! Procrastination, postponement, incompetence, are evident in every stone of those crowding masses.

It is not my desire to present any startling innovation or describe any easy and royal road to success in the diagnosis of such conditions. Methods that are practical and eminently satisfactory are described in many current writings within the reach of all who would seek them.* But it is hoped by these appealing histories to show what is commonly occurring in life, and to illustrate the extremes of unnecessary misery and suffering to which human beings are reduced by ineffectual examinations and deferred recognition.

Here were two young men, 26 and 31 years of age, respectively, and a young woman 17, who throughout their lives, up to the time of the removal of the diseased kidneys, never knew what it was to have comfortable health or satisfactory existence.

Their histories are so much alike that the recital of one will almost do for all.

At first by their parents, later by them, all of the medical talent available was utilized in consultations and treatment, but to no purpose. Unnumbered opinions and guesses were obtained, and endless suggestions were received, but never was a definite, purposeful examination or a tangible diagnosis made.

* A short working formula for physical examination is given later in this paper, which, if conscientiously followed, will lead to satisfactory results in nearly all cases.

It was always opinions and treatments but never a diagnosis. Is it cause for wonderment that they concluded that "everything had been done that could be done," and that it was scarcely worth while to seek further for relief?

The wife of one of the patients wrote the following history of Mr. F., whose kidney specimen is shown in Fig. 1:

Walter F., Hamilton, Mo., age 26, farmer. Clouding of patient's urine was noted in his infancy and has always been present. He was not strong in childhood, and was unable to participate satisfactorily in the games of boyhood companions.

Fig. 1—Multiple stones in the kidney (Case I); symptomatology over twenty years.

He had chills, followed by fever and sweating, a number of times every year. He also suffered pain and undue frequency of urination, and indigestion. Several of the physicians consulted said it was nothing serious and would be outgrown in time, so they were finally not called again. In 1907 he was examined for life insurance by Dr. T. B., of Missouri, who said he found evidence of gonorrhea in the urine. Knowing himself innocent of gonorrhea, the patient was not alarmed, but being rejected a second time for the same reason, his wife insisted on further examination being carried out. He consulted several doctors in one of the large cities of Missouri, and received additional but inharmonious opinions on his case. One said there was no gonorrhea; in fact, no especial trouble, only a weakened constitution. While he would never be rugged, he would be comfortable as long as he took care of himself. But he occasionally had chills, followed by high fever and vomiting, with aching over his body. He never had hematuria, and never any characteristic pain in the back, except on lifting or over-exercising. Another life insurance examination was followed by rejection on account of "Bright's disease." Later a physician said there were no symptoms of Bright's disease but reverted to the former diagnosis of gonorrhea. Finally, on further investigation, this diagnosis was modified (or mollified?) and a compromise was arrived at by this physician; he concluded to call it tuberculosis, although no tubercle bacilli were ever found by him.

The patient's hope of relief had practically ceased and he took no more interest in seeking it, having concluded that it was a useless endeavor. It was only the insistence of his wife that impelled his call on me in September, 1911, and led to the physical examination with cystoscopy, ureteral catheterization and radiography, and the development of the definite diagnosis of stone-kidney on the left side and healthy kidney on the right, nephrectomy and prompt establishment, for the first time in his life, of health and strength. I have learned that twelve months following his departure

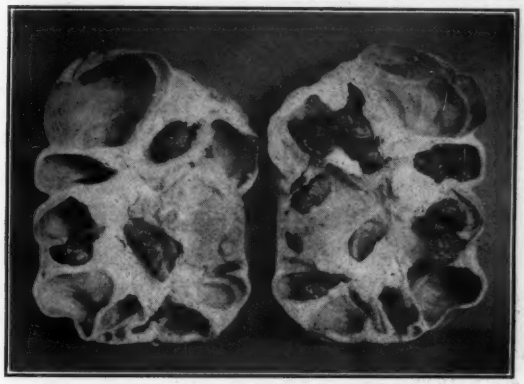

Fig. 2—Multiple stones in enormous kidney (5 x 5 x 7 inches; Case II); symptomatology nearly thirty years.

for home he became the happy father of a healthy boy.

The second case is that of a young man, H. T. R., of De Soto, Mo., age 31, engineer, unmarried. His earliest remembrance of childhood was connected with pains in his left side, especially on exercising actively; together with severe headaches and more or less chronic invalidism. There was also an impression of urinary disturbance, and conferences with the family physician without arriving at any definite conclusion. For seven years previous to his coming to St. Louis, definite knowledge of urinary disturbance had been attained in the condition of the urine, which was always chalky-white in color, and increased in quantity.

His efforts in search of medical assistance are interestingly told by the patient, names being omitted for obvious reasons.

In 1900, Dr. A. gave treatment with medicines, but made no attempt at a diagnosis; in 1902, a similar service was rendered by Dr. B., also of St. Louis. No relief was given in either instance. He then went to Montana and was under the care of Dr. C., of ————. No diagnosis but considerable medicine was the net result. This was in 1909.

Next, Dr. D., of ————, Minnesota, in August, 1911, examined the urine (which was still white, with occasional brownish tinge; red blood cells?) and prescribed lithia tablets.

In October, 1911, Dr. E., of ————, Minnesota, gave him some blue pills (methylene?) and said the bladder needed irrigating. Still no diagnosis. The patient about that time discovered a fullness in his left flank (afterwards proved to be the greatly enlarged left kidney). In 1912, he went back to Dr. D., who again treated him; this time with medicine and electricity; no diagnosis. The patient repeatedly called attention to the presence of the tumor in the left side, but the physician as often assured him that it was of no consequence. However, this physician called into consultation Dr. F., of the same town. Together they made a "complete external examination" and diagnosed the condition as one of enlarged spleen. Finally Dr. D. advised the patient to see some genito-urinary specialist. In October, 1912, he consulted Dr. G.,

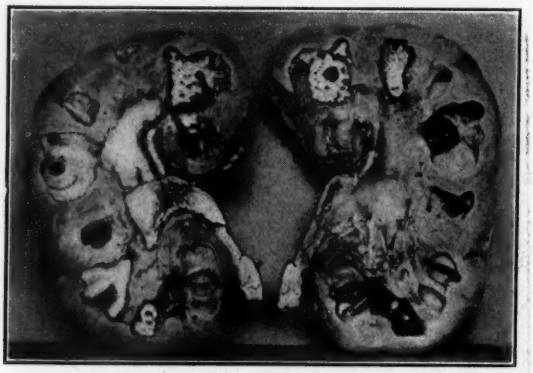

Fig. 3—Multiple stones in kidney (Case III); symptomatology upwards of thirteen years.

who rendered the diagnosis "tuberculosis," and gave medicines and rest in lieu of treatment. On October 8, 1912, Dr. R. E. Donnell, of De Soto, Mo., made the tentative diagnosis of kidney trouble and referred him to me.

He was then meager, sallow and debilitated to an extreme degree, evidently the "last stages" of —something; and when we whiffed the odor of the foul urine that he emitted, we concluded that it was impending decomposition. The kidney tumor was so prominent that it could not escape notice, no matter what his position.

Urinary chills and fever were adding to his miserable state. All of these features are mentioned for their bearing on the wholly neglected phase of the case—diagnosis. They were glaringly prominent, but ignored.

The diagnostic formula, to be mentioned later, was carried out on the patient; it readily led to the definite diagnosis of pus-kidney on the left side and healthy kidney on the right side; and the operation of nephrectomy (Fig. 2) was done on October 29, 1912. This was not an easy procedure, because of the enormous size of the organ and numerous adhesions encountered. However, the patient recovered within two weeks, and on leaving for home, November 23, 1912, declared that he could not remember when he had felt so well.

The prolonged sufferings and delayed recognition in these cases I have previously characterized as unnecessary. That term was used advisedly. If the few and simple requirements of the following diagnostic formulary were carried out, practically all such cases could be solved promptly, readily and almost with certainty.

In the first place, put no faith in symptoms. Put your trust in reliable returns given by searching

Fig. 4—Radiograph shadows of stones in the kidney and catheter in the ureter (Case III).

physical examination, including the modern methods of internal inspection and investigation:

1. If there are urinary disturbances of any sort (no matter what the "symptom" prevailing), examine the urine—preferably divided into two clean glasses while being passed.

2. Cloudy or bloody or murky urine indicates the necessity of microscopical examination, with and without staining of the sediments.

3. If the clouding is from phosphates or urates it may be negligible; if from pus or blood, the duty staring one in the face is to learn (a) *What part of the urinary tract it comes from;* and (b) *its causation.*

4. If the bleeding or suppuration is proved to be in the lower part of the tract (urethra, prostate or seminal vesicles), there is no need for cystoscopy; but *if this cannot be established,* and there is good reason for suspecting the upper tract, *the direct and unavoidable indication is for cystoscopy,* and must not be neglected on any account. It means cystoscopy and double ureteral catheteriza-

tion, with sounding of the ureters for obstructions, and drainage of the respective kidneys independently; with searching investigation of the two urines thus obtained, and detection of any pathological features present, such as pus, bacteria, blood casts, epithelia, etc.

5. Identification of pus or infection in either kidney commonly indicates the application of *x*-ray photography to that side, with or without the coincident use of radiograph ureteral catheters or collargol injection for further elucidation.

In carrying out this practical method of investigation, skill and common sense are obviously needed. But in order to reach accurate conclusions, it does not require the superhuman deductive ability of a Sherlock Holmes, such as is needed when the conclusions are based on a reading of urinary symptoms.

Urinary symptoms are notoriously untrustworthy and misleading, directly and indirectly; positively, negatively and by transposition.

Base conclusions on the "documents in evidence"—the results of comprehensive physical examination.

Addendum: Since writing this report, another case, almost a duplicate of these, has been received and operated on by me—a large pus-kidney packed with stones of varying sizes (Figs. 3 and 4) being removed by extraperitoneal lumbar incision, and satisfactory convalescence is now progressing. But the interesting feature about it is the resemblance of this history to the two just related. It pertains to a young lady of 17 years, whose urinary complaint began when she was 4 years of age; with renal colic, temporary suppression of urine, the passage of several small stones; after which followed the long-drawn-out years of invalidism, debilitated health, pain in the back, milky (purulent) urine, many medical conferences, much "treatment," no definite examination or diagnosis.

Practically seventy years, in the three cases, were spent in futile search for relief before definite plans were undertaken to give that relief.

550 Century Building.

Remember that tuberculosis is prone to attack the cancellous structure of the bones of the tarsus, and more often in adults. Unless you act promptly, it will soon involve the extensive synovial cavities, and the foot will be lost. Make the diagnosis early, and remove the focus, or the bone, lest you have later to remove the foot.—Bernays' Golden Rules of Surgery.

SOME POINTS IN THE DIAGNOSIS AND MANAGEMENT OF THE SURGICAL DISEASES OF THE KIDNEY AND URETER.*

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With the numerous modern clinical and laboratory aids to diagnosis, nephro-ureteral disease should seldom be overlooked. Even complicated cases and anomalous conditions which formerly could merely have been suspected may now be beautifully cleared up so that by the time the patient arrives at the operating table the surgeon may feel perfect confidence in his plan of operation as well as in his ability of execution.

However it is to his own physician that the patient with kidney or ureteral disease must look for the primary diagnosis, and it is his own physician who must decide when it is necessary to seek further advice or treatment.

It appears to me that while consultation with specialists is most desirable and important, there is such a thing as too early a shifting of the responsibility. The patient has a right to a proper working up of his case by his own physician so that by the time the consultant is called such data as every practitioner of medicine should be able to provide may be available. When securing this information the various diagnostic procedures should follow each other in an orderly and proper succession. Haphazard examination is to be condemned even though eventually all sides of the case may be covered. As a rule the milder methods of investigation should precede the severer ones. I might suggest the following as a satisfactory sequence.

I. *The history,* remote and immediate, especially as to pain and its location; colic; strangury; frequency; time of the attack; fever or chills; changes in nutrition; remedies which appear to have given relief. Of considerable weight may be the patient's own observations of physical signs and phenomena, the presence of blood or pus or mucus in the urine.

The date of a life insurance policy may fix a period of probable normal health. The patient's observation of a change in bodily outline or the presence of a tumor forms a mental picture which may be of importance.

II. *The examination of all easily reached parts of the patient's body by the usual methods*—inspection, palpation, auscultation, percussion. And here let

* Read by invitation at a regular meeting of the Newark Medical League, December 16, 1912.

me say that not only does the average patient appreciate a painstaking examination but that the physician cannot help gaining useful and important knowledge by insisting upon the complete "physical" in each new case. The rectal and vaginal explorations are actually essential to thorough work of this kind. I have detected the presence of calculi in the pelvic portion of the female ureter by careful palpation of the iliac fossæ together with bimanual exploration. The following case history will prove of illustrative interest.

CASE 1. Mrs. P., 30 years old, was four months along in her second pregnancy. While carrying her first child she had a number of attacks which were diagnosticated as pyelitis of the left kidney. Just before the child was born she had a sudden onset of lumbar pain with chills and vomiting. The urine at this time contained pus and blood, but under medical treatment her trouble had apparently subsided. On the 2nd of September, 1912, I saw her in consultation with her physician, Dr. Spivack. She had been suffering for four days with sharp renal colic, fever and chills. So severe were the pains that it was absolutely necessary to administer an opiate. The urine contained blood and some pus which under the microscope appeared here and there to be arranged in clumps.

The fundus of the uterus at this time was about two inches below the umbilicus; the pulse was slow, about 80, and the temperature about 101.6°. The following day the patient was admitted to Mt. Sinai Hospital where, under treatment with very small doses of urotropine, rest in bed and poulticing, the attack subsided and did not recur. There was now a tender mass in the left loin which appeared to be the kidney somewhat enlarged and prolapsed. An *x*-ray picture by Dr. Jaches showed an enlarged kidney on the *right* side and a stone the size of half a peanut in the left pelvic ureter close to the bladder. Our interpretation of the enlargement of the right kidney was that for a long time extra work had been thrown upon that organ. On October the 5th I examined her with the cystoscope and easily catheterized the right ureter, while in the left I met with a complete obstruction about an inch above the bladder. The vesical mucosa in the neighborhood of the left ureter was hemorrhagic and distinctly edematous. On October the 9th, about two weeks after admission, the patient being now in excellent general condition and free from pain, she was anesthetized and I dilated the urethra to admit the largest sized Kelly's cystoscope, hoping to be able to reach the calculus through the ureter near its vesical mouth and extract it with forceps. Because of the inflamed condition of the mucosa in the neighborhood of the ureter, the orifice could not be found, so removing the Kelly's tube I inserted my left index finger into the bladder through the urethra. The calculus was easily felt and with some difficulty it was forced into the bladder by kneading it out between the finger and the bony pelvis.

It was extracted through the urethra without forceps. There was practically no hemorrhage and the patient left the table in excellent condition.

I had frequently noted that when hexamethylenamine had been administered in cases in which there had been recent traumatism of the urinary passages the liberated formaldehyde apparently acted as an irritant, sometimes even producing necrosis of tissue. Therefore instead of a formaldehyde liberating drug, salol was ordered. She made an excellent recovery and was discharged in about a week, well and with no incontinence. Hexamethylenamine medication is to be resumed.

I have seen at least two cases of prostatic disease with distention and overflow in which the physician had mistaken the frequent micturition for a symptom of nephritis. The urine, to be sure, had indicated the kidney lesion and so far the diagnosis had been correct, but the most casual examination of the abdomen would have demonstrated the more menacing condition in the visible hypogastric tumor representing the over-distended bladder. The gloved finger in the rectum would then have settled the question.

III. *Examination of the urine.* This is not the place to go into the technic of chemical uranalysis. There is surely not one physician who would omit this necessary procedure. But in suspected surgical diseases of the kidney or ureter immediate examination with the centrifuge and microscope will always give reliable information. I would urge that every practitioner of medicine or surgery, even though he delegate chemical analysis to the laboratory specialist, should possess and properly use these indispensable helps.

It has more than once happened that a patient who had been referred to me for operation for appendicitis and who complained of right iliac tenderness and colic had been really suffering from the effects of an impacted ureteral calculus, the first suspicion of which was aroused by the discovery of microscopic blood in the clear urine, the diagnosis being later confirmed by radiography, cystoscopy and operation. Indeed so frequently has this observation been made that in my hospital services I invariably order careful search for red blood cells with centrifuge and microscope in every case admitted with a diagnosis of chronic appendicitis even though the history appears plain enough. Should red cells be found, operation is deferred until radiography shall have demonstrated the presence or absence of calculi. And if the plate shows no stone there is cystoscopy to account if possible for the hematuria. When this phenomenon cannot be otherwise explained, the original diagnosis is acted upon.

Crystals of the various calculus-forming salts are suggestive especially when accompanied by blood or pus cells—but this is not a treatise on urine examination.

IV. *Radiography.* The expense of a set of plates of the entire urinary tract is no small one and the annoyance incident to the radiographic exposure may be considerable, but both should be borne for the sake of information which cannot be gleaned in any other way. Calculi and tumors are usually discovered if present and anomalies, and many gross structural alterations of the kidney are sometimes clearly demonstrated. When an *x*-ray examination is desired better send the patient to a responsible specialist, and not only make it a point to see the plates yourself, but try if possible to arrange for a personal interpretation of the picture by the radiographer. Radiographic plates properly taken will never lie, but a false interpretation of the best plate in the world is common enough. The reading of the picture is a more important branch of the specialty of Roentgenology than the mere making of the plate. And also insist upon having a written report for your files.

V. After radiography comes the *cystoscopic examination of the ureters and kidneys.* This sequence; radiography first, cystoscopy afterwards, should be strictly observed because cystoscopy is apt to be attended with greater inconvenience, not to say danger to the patient, than modern examination with the *x*-ray. Even without ureteral catheterization the cystoscope will show by mere observation the condition of the ureteral mouths and the appearance of the vesical mucosa in their immediate neighborhood. The suspicion of renal tuberculosis may be greatly strengthened by the picture of a red, easily bleeding or even ulcerating condition adjacent to the ureteral opening. A pouting ureter in normal surroundings, discharging small quantities of sanguinolent fluid, may convince one of the presence of a calculus even when the stone is too small to be radiographed.

CASE 2. One day early last month I received an urgent message from a colleague who had great pain in his left lumbo-abdominal region. Large doses of morphine had given scant relief. The urine showed a little blood and a few pus cells. Actual strangury was absent. The temperature was very slightly elevated; there had been vomiting. At my suggestion he entered Mount Sinai Hospital where, after a preparation by cathartics, a beautiful radiographic plate of the entire urinary tract, both left and right, was made by Dr. Jaches. Absolutely nothing abnormal was found. I then introduced a catheterizing cystoscope and found the right ureter normal, easily admitting the large sized catheter. The left ureter was pouting so that it appeared like the crater of a miniature volcano and to add to the resemblance there were intermittent eruptions of slightly blood-stained fluid. No calculus could be seen in the crater-like mouth, but no catheter would enter the opening, the tip not even engaging but sliding as it were down the declivity of the volcano at each attempt. The slightest contact of the tip of the catheter with the ureter excited an expression of pain on the part of the patient. In spite of the negative findings of the *x*-ray I diagnosed ureteral stone and instituted a treatment by hot baths, rectal irrigations and the ingestion of large quantities of water. For nearly four days the patient suffered greatly and it was necessary to resort frequently to

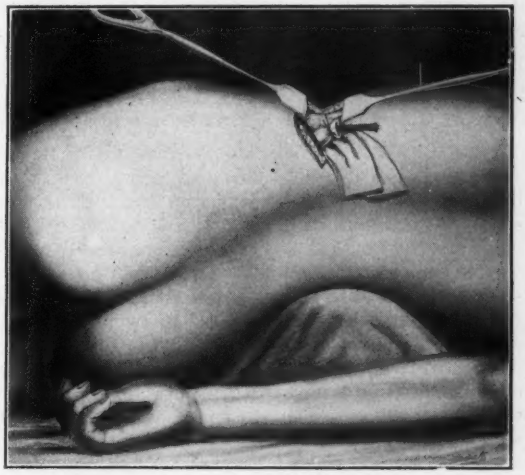

Fig. 1. Nephrectomy wound. Urethral bougie tied in the ureter.

opiates. Then suddenly the pain ceased and he expelled by urethra a small, black, rough calculus, probably calcium oxalate, two and one-half grains in weight. This man had suffered so intensely and for so long a period that without diagnosis by the cystoscope and in the absence of positive information by the radiograph, he would in all probability have been subjected to an exploratory nephrotomy.

Thick pus in a snaky cylinder emerging from the ureter with a slow motion like vaseline from a collapsible tube, signifies a useless kidney on that side—provided there is a working organ on the other. Naturally even a "useless" kidney may be worth saving if it happens to be the only one in the patient's body.

And here let me call attention to the often repeated warning that there is such a thing as congenital solitary kidney. When this single organ becomes diseased it requires treatment by conservative surgery *de luxe*—a kind of surgery which would be considered out of place in the presence of a remaining healthy organ which might suffer infection from

the too long continued presence of its suppurating fellow.

And now a few words as to the importance of thoroughness in each and every method of examination. I once saw a case of papillomatous colitis in which rectal hemorrhages formed one of the striking signs. The patient came to a surgeon complaining of hemorrhoids and indeed she did have hemorrhoids, and the surgeon operated upon her and she recovered from the clamp and cautery but continued to have rectal hemorrhages. Later on she was further examined and the true diagnosis was made. I then operated, removing the entire colon and curing the patient. An examination of the higher portions of the rectum would have placed the surgeon at once on the right track and would have saved him chagrin. The same general error can occur in disease of the kidney.

The following case will demonstrate this:

CASE 3. W. F., 34 years old, consulted me on the 9th of April, 1912. Fifteen years before he had had his first attack of gonorrhea. This was said to have been cured, but since that time there had been four or five other attacks. Five years before his visit to me he had had right renal colic and since then this distressing symptom had recurred a few times. Seven years before I saw him he had contracted lues, for which he had received treatment for two years, the efficiency of which was demonstrated by a negative Wasserman's blood test taken shortly before his visit to me. Pain in the supra-pubic region, which was worse on walking, appeared to be his chief complaint. Once or twice during the night he had to urinate. He had been treated by a genito-urinary specialist for pyuria, which was supposed to have its origin in the deep urethra and trigonum. He had been cystoscoped but the ureters had not been catheterized. The mouths of the ureters were described as "normal" and were said to have emitted clear urine. The following extracts from letters written to the family physician by the specialist who had examined the patient will show his attitude in regard to the case. "Careful washing from the various portions of the urethral tract by the three glass catheter tests show that there is practically no discharge of pus from the anterior urethra. That is to say, of the pus found in the urine very little if any comes originally from the anterior urethra. By actual test some of it comes from the bladder and some from the posterior urethra. Possibly the pus in the bladder comes from the kidneys and ureters. The prostate is large and congested and gives evidence of a long standing chronic prostatitis. In view of these conditions I have advised cystoscopy. I expect to use the cystoscope and the cystourethroscope so that a fine view of the entire urethral tract will be obtained. Possibly we shall find a stone, possibly a lesion of the kidneys and ureters, or possibly the bladder alone, et cetera."

The date of this letter was September 6, 1911. And again September 10, 1911, after the cystoscopy. "The orifices of the ureters are apparently normal and so is the bladder except at the trigonum which is markedly inflamed and thickened. *There is no stone.*

"The posterior urethra and verumontanum are also highly inflamed, thus indicating that the main trouble lies in the deep urethra and prostate. I would recommend daily irrigations of the bladder, et cetera."

My own examination of the urine showed large quantities of pus, the cells lying singly and in clumps. There were also a few red cells. I advised the patient to submit to radiographic examination and to ureteral catheterization and in the event of a unilateral renal suppurative disease, to submit to nephrectomy. The radiograph by Dr. Jaches showed the opacity of calculus in the right renal region, probably the pelvis. A few days later I catheterized the ureters, passing easily into the left normal ureteral orifice and drawing therefrom clear urine. The right ureter was impassible for more than one and one-half cm. and from this side no urine flowed. The right ureteral region of the bladder was highly injected and edematous and around the location of the ureter there was what looked like edematous granulation tissue. Examination of the urine from the left kidney indicated a normally functioning organ.

On April 24th, the patient having entered the Private Pavilion of Mt. Sinai Hospital, I removed a kidney which was almost completely degenerated and which contained in its very much dilated pelvis a single almond-sized irregular rough calculus. The ureter was enormously thickened and was as large around as an adult's thumb. It was removed through a second small inguinal incision and the patient made an absolutely uneventful recovery.

This case very nicely illustrates the error which may arise from a lack of thoroughness even at the hands of a specialist well versed in the technic of urology. Had the ureters been catheterized the surgeon could not have failed to have been struck by the difference in the appearance of the urine from the right and left sides, and this would have suggested the necessity for radiography. Or, still better, had he followed the sequence of procedure here recommended he would have required cystoscopy merely to determine the presence of a left functioning kidney.

In this case which I have just reported there was obvious destruction of the kidney and great degeneration of the ureter. There could be no question here as to the advisability of nephrectomy. Now, however, suppose that the kidney had been but slightly infected or not infected at all. What would then have been the proper method to pursue? Formerly I tried in every case to extract the calculus and save the kidney at any cost. This method I have now abandoned *in the clearly infected cases,*

bending my efforts to saving only uninfected kidneys. When suppurative changes exist in a calculus-bearing kidney more stones will form after operation in so large a proportion of cases that as a rule the patient will blame the surgeon who left such an organ in his body. It has happened to me that after a careful and painstaking operation with an uneventful recovery and the post-operative *x*-ray radiograph proving the absence of calculi, that stones recurred with increasingly severe infection. Again, it happened that non-calculus infection persisted in spite of the first operation. In both cases nephrectomy had to be done secondarily: a dangerous and difficult procedure. My advice now is to sacrifice the kidney if there are gross changes due to the presence of stones, *plus infection*—provided always that the other side is healthy.

When there are ureteral calculi with obstruction and fever but no stones in the kidney itself, a determined effort to get rid of the obstructing calculi by medical means should be made and failing this, by the operation of ureterotomy. There is a good chance that the obstruction having been relieved the non-calculous though pyelitic kidney will recover.

Unless there has been long continued pain or constitutional disturbance, I am a believer in the efficacy of water taken in large quantities, say two quarts twice daily, and between meals, with the idea of forcing the obstruction. In this I have been successful after days, weeks or even months of treatment; but only when the radiograph demonstrates a stone not larger than an ordinary white bean—though I am well aware that the passage of stones of a much greater caliber has been reported. Occasionally one may succeed in hastening the passage of a stone by injecting sterile oil into the ureter preferably above the obstruction, but sometimes also even below it.

CASE 4. Benjamin Z., 40 years old, had suffered with rheumatic pains in the back and lower extremities for two years. He entered my service at Mt. Sinai Hospital on the 1st of April, 1911. A few days before he had had an attack of typical left renal colic accompanied by vomiting. There had been turbid urine at times tinged with blood. There was tenderness in the left costo vertebral angle and in the left hypochondrium, but the kidneys were not palpable. The skiagram revealed a pea-sized stone at the level of the third lumbar vertebra to the left of the median line. For the following seven days he had frequent attacks of colic which required morphine to control the pain. On the 8th of April I cystoscoped the patient and passed a catheter into the left ureter, encountering an obstruction about one and one-half centimeters from its orifice and a second *x*-ray showed the stone to be at that level. In other words, it appeared to be descending. Eleven days later I again passed the cystoscope and saw a black mulberry calculus filling the mouth of the left ureter and in attempting to dislodge it I pushed it up into the canal. I then injected ten cc. of olive oil into the ureter and massage was practiced through the abdominal wall. The stone then appeared once more in the mouth of the ureter and the patient was sent back to the ward, where he was given large draughts of water. The following day he voided the stone and a final picture showed its absence from the urinary tract. He left the hospital entirely well four days later.

CASE 5. Albert W., 35 years old, was brought to me by Dr. H. A. Cone on March 28, 1912. He had for eight years been a great sufferer from attacks of renal colic with fever and occasional constitutional disturbance, but without loss of weight. Numerous surgeons had examined him and a number of *x*-ray pictures had been taken, none of which disclosed a calculus. The urine had periodically contained pus and blood, occasionally, however, becoming quite clear, the latter phenomenon suggesting at once the presence of an intermittently obstructing stone, the clear urine coming at the time of obstruction from the opposite presumably healthy kidney. About two months before I saw him he had had an attack with a temperature of 104°, yet in a few days he had recovered. Cystoscopy had been performed by several competent men and pus had been observed coming from the right ureter, clear urine from the left.

Fig. 2. Inguinal incision with ureter and its contained bougie drawn out of the wound.

There was no mass palpable, and in fact no objective signs at the time of my examination. The urine then, however, was chocolate colored and contained flakes of what looked like fibrin. A bacterial examination had been made some weeks before which showed colon bacillus in pure culture, and from this an autogenous vaccine had been prepared with which the patient had been treated. In the total absence of positive radiography the only actual

diagnosis which could be made was that of pyelitis. Although the patient's general condition and physique were excellent, tuberculosis could not be absolutely excluded.

He entered Mt. Sinai Hospital and on March 30 I catheterized both ureters. There was pale urine from both sides, the centrifuged sediment from the right side, however, containing blood and pus while from the left side there came urine with only a few blood cells, probably due to the traumatism of the catheterization. With this rather insufficient diagnosis, but with a history of so long a period—eight years—of illness, I decided upon operation and the patient agreed.

On April 1st, in ether anesthesia, the usual transverse incision was made and a rather small kidney was delivered into the wound with difficulty and with the sacrifice of a portion of the twelfth rib. Calculi of considerable size were at once felt through the walls of the dilated pelvis and because in addition there was evident infection, the left kidney being obviously adequate and healthy, an immediate nephrectomy was performed, the flaccid and apparently normal ureter being ligated low down in the wound.

Two calculi aggregating in size the bulk of an English walnut were found and on analysis by Dr. Bookman, physiological chemist, these were shown to consist of pure uric acid, this accounting for the negative *x*-ray findings, pure uric acid stones, especially in a stout individual, being very difficult to discover with the *x*-ray.

It is indeed difficult to believe that a stone of this size could have gone so long undiscovered and one might almost say unsuspected. Three weeks later this patient was discharged from the hospital entirely well and in a few months he called to report that he had had no further trouble. Because of the chemistry of these calculi, the patient is under dietary treatment in the hope of preventing the occurrence of similar concretions in the other kidney.

Hypernephroma. This is a form of vascular malignant tumor which is probably congenital though it may not be discovered until late in life. It appears at times to be due to the inclusion of aberrant adrenal tissue in the substance of the kidney. While this form of tumor may be primary in other organs, for example the liver, it is undoubtedly commonest in the kidney. It metastasizes in the liver and flat bones, but may show secondary tumor in the long bones as well. It is frequently but not invariably characterized by hematuria. The disease is slowly malignant but is nearly always fatal because its presence is discovered too late. Usually when there is a palpable tumor it is too late to prevent local recurrence even with the most radical extirpation. In examining any patient who presents the phenomenon of hematuria it is important to explore carefully by inspection and palpation the cranial bones, ribs and sternum. If he complains of what he calls "rheumatic pains" in any region, radiography should be practiced. The discovery of a tumor even of small size in bone in a patient suffering from intermittent hematuria is most suspicious, and if the tumor shows expansile pulsation we are probably dealing with a metastatic hypernephroma and no operative procedure can succeed. I have operated about sixteen times for this disease and only one of the patients remained permanently well. In this case hypernephroma was discovered by the pathologist on gross section of a kidney which I had removed because of repeated severe hemorrhages.

The rule is that even with the grave prognosis hypernephroma should be treated by nephrectomy provided there are no metastases and provided that the surrounding tissue is obviously uninvaded and that there is a second healthy kidney.

Renal Tuberculosis. A number of years ago I saw a patient in the practice of another surgeon who came with a history of intermittent hematuria and whose urine was loaded with tubercle bacilli, though there was no fever and the urine contained no pus. The infection was evidently one of pure tuberculosis. It was before the days of the frequent employment of the catheterizing cystoscope. This patient made a final recovery without operation. It is not the only case of this kind which has come to my notice. It means that the presence of tubercle bacilli alone without constitutional symptoms and without suppuration need not be considered a disease which is in urgent need of operation. A minute tuberculous ulceration in the pelvis of the kidney may throw out numerous bacilli and may be the cause of hematuria. A far greater degree of tuberculosis in the form of discrete cortical abscesses may exist in the opposite kidney and yet there may be little or nothing to indicate it in the urine. Tuberculosis of the kidney is to a limited extent analagous to tuberculosis of the lung—it may get well without operation. Still, when there is great destruction of tissue or when there is a mixed infection with suppuration, such a kidney in the presence of a functioning fellow should be removed. There is not time this evening for a proper discussion of this most interesting subject, but there is one point which I wish to bring out in concluding my paper, namely, the necessity of a complete operation when tuberculosis of the kidney is to be attacked surgically.

In the *Annals of Surgery* for April, 1911, I attempted to point out the great importance of removing not only the kidney but the entire ureter as well in cases in which the ureter is diseased or badly drained because of stricture at its vesical end.

This operation used to be so formidable, meaning the extension of the incision from near the spine half way round the body almost to the pubes, that surgeons contented themselves with ligating the ureter as far down as they could and in the event of further trouble, dissecting it out through the enormous incision just described.

We used to quiet our fears with the idea that the ureter seldom gave trouble. As a matter of fact, however, the tuberculous ureter very frequently gives trouble and is the cause not only of persistent annoying sinus but also of symptoms resulting from tuberculous material pouring into the bladder. Only

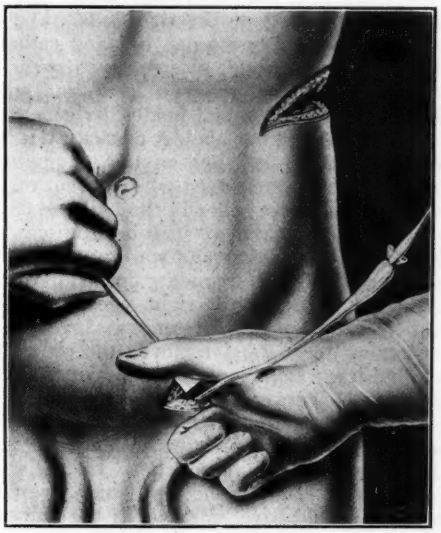

Fig. 3. The bougie has been withdrawn and the ureter extracted at the inguinal wound. It still remains attached at the bladder and the index finger is loosening the lower portion previous to ligation and removal.

those who have dealt with this most annoying class of cases can appreciate the great advantage of doing away with this danger by the simple expedient which I have devised.

In a few words the method is as follows: Having performed nephrectomy an ordinary *urethral* bougie about the size of No. 10 to 12 French is pushed down through the ureter from its upper divided extremity to the bladder and tied in place with a ligature. The ureter is now digitally isolated through the nephrectomy wound as far down as possible. The nephrectomy wound may then be closed by suture in the usual manner with drainage by tube, gauze or rubber dam. The patient is next placed upon his back and a short inguinal incision parallel to Poupart's ligament, seldom more than two inches in length, its lower inner extremity being close to the external border of the rectus, is carried down through the tissues as far as the peritoneum. Now the finger is used to push the unopened peritoneum away from the pelvic wall. The ureter with its contained bougie is extremely easy to recognize and in fact can hardly be missed. With the back of the finger toward the pelvic wall, the ureter is peeled away from the peritoneum. The danger to the great iliac vessels is practically zero since the ureter always adheres to the peritoneum and is lifted away with that structure.

With a little manipulation the ureter is drawn out of the wound, loosened from below upward, and as a rule very easily is drawn with its contained bougie out at the inguinal wound. The bougie is now extracted and it will be found that the entire ureter down to its termination at the bladder can be drawn up into the wound. Here it is ligated, cut off and the stump carbolized. The wound is closed with three layers of sutures, with or without drainage.

This method of removing the ureter adds seldom more than ten or fifteen minutes to the length of the operation, and we then have the great satisfaction of knowing that the entire tuberculous focus has been extirpated.

I have done this operation now about twenty times and in each instance it has been most satisfactory. A glance at the drawings will perhaps demonstrate the method better than my words.

In closing I would like to emphasize again the point which I have tried all along to bring out: that by adhering to a scientific sequence in the examination of patients suffering from disease of the kidney and ureter there will be an increasing percentage of accuracy in diagnosis and efficiency of treatment.

INDICATIONS FOR OPERATION IN CHOLELITHIASIS.

To my mind the mere diagnosis of gall-stones is sufficient to warrant an operation. This opinion is based on the fact that all gall-stones are doing more or less harm. In these cases the early pathology is much more simple than is the late, and if we operate during the early stages we shall be able to accomplish the necessary object by means of a simple and safe procedure, and the chance of radical and permanent cure is much greater than it will be if we wait until complications have set in. Nearly all complications are the result of delay. All things being equal, the death rate of biliary surgery bears a distinct relation to the period of the disease. Deaver aptly says that a low mortality rate obtained by a surgeon is a tribute to the knowledge and skill of his medical confrères who sent him cases. Most of the mortality in biliary surgery is due directly to delay. Prolonged jaundice is the cause of fatal hemorrhage.—PARKER SYMS, in the *New York Medical Journal.*

NARRATION OF A FEW CASES OF NON-FUNCTIONATING OR DERELICT KIDNEYS.

RAMON GUITERAS, M.D.,
New York.

It is interesting in this symposium on the kidney which is being considered in this issue of the Journal to mention some cases of non-functionating kidneys which I have encountered from time to time, and which I have spoken of in my lectures as derelict kidneys—that is, kidneys in which the renal function has been suppressed. In some of these pus was found in the kidney. I will give a brief description of the cases and at the end make a few general remarks. They were all due to either tuberculosis or stone. The cases due to stone were especially interesting on account of their relation to anuria.

CASE I. The first of these cases that came to my attention was that of a farmer aged 38, very large and robust, with a red, healthy face. The patient complained of frequency of urination, pain and tenesmus. Examination showed a deep stricture of his urethra, and his urine contained bladder and renal elements. No tubercle bacilli or gonococci were found. A perineal section was performed from which he made an uneventful recovery, and although his urethra remained a good size his bladder capacity increased but little. Cystoscopy had never been satisfactory in this case on account of the very small amount of fluid that could be held in the bladder—an ounce at a time. He still complained of pain after the operation. He was radiographed and a stone was seen in the left ureter at the pelvic brim. An incision was made from just above the anterior superior spine of the ilium down along the groin to the inner side of Poupart's ligament. The peritoneum and its contents were drawn toward the other side of the body and the ureter was seen with an enlargement at the side indicated by the radiograph. The ureter at this point was conical in shape and about ¾ inches in diameter. Palpation of this area did not indicate the presence of a stone. An incision was made vertically and no stone was found, the dilatation being due to an accummulation of a yellow, cheesy material closely resembling mayonaise. Accordingly the incision was continued upwards and backwards along the line of the ureter until the kidney was reached. This was about normal size but was a pale color. I cut down through the kidney and came to another thick accummulation of a similar material in the kidney. In cutting through the convexity of the kidney to explore its pelvis there was almost no bleeding, showing that the kidney tissue was not functionating. This may have been due to the stricture just below the accumulation of pus at the pelvic brim which had entirely shut off the ureter and caused sufficient back pressure to give rise to rapid kidney atrophy. The kidney was removed and I have always considered the case tubercular, although no tubercle bacilli were found by the pathologist who made the examination. My reason for believing it to be tubercular was that I did not know of any other cause which could give rise to a stricture at this point in a man of his age. I do not believe that the kidney had secreted urine for a long time.

CASE II. Some time ago a young girl was sent to me from Puerto Rico. She had been treated for cystitis. She had great frequency of urination, passing her urine every few minutes night and day so that I had to have her wear a urinal. An examination of the urine showed it to be of low specific gravity, acid reaction, some albumin, some pus, a number of red blood cells, bladder, ureteral and pelvic epithelia and hyaline and granular casts. She had slight tenderness on the right side. We made several attempts to cystoscope her and catheterize her ureters, but were not able to do so even under anesthesia. I treated her with local and general remedies for some time and finally her general condition improved and her bladder capacity was somewhat increased. I left her on the service of the hospital very much improved when I went off duty. When I returned I saw her in the hall one day and found that her treatment had been discontinued during my absence; that she was running a septic temperature due to a secondary infection and had a very large tumor on the right side. I succeeded in catheterizing her left ureter and found healthy urine coming from it. I removed the right kidney which had large cavities as clearly defined as those of cysts, and between these cavities were large masses of tubercular infiltrate. I do not recall the variety of secondary infection in this patient, but the kidney was non-functionating. In talking over this case with one of the gentlemen present he asked what would have happened if the kidney had not been removed. I said that if the patient did not die from sepsis and if there was no infection of the other kidney and no involvement of any other part of the body the kidney would continue to break down and become a mere shell containing a mass of broken down tissue, some of which would have been absorbed and the other part remain as fibrous tissue. He rather took exception to this statement and said that he had heard the opinion expressed that a patient could live only two years with tuberculosis of the kidney. I had maintained that they could live for a long time and that I had cured them without operation; also that I had had cases which had fully recovered.

I Accordingly went to the Bellevue and asked the pathologist if he had any kidneys that had been completely destroyed. He said that he had and gave me one, a picture of which I have at the present time, and it tallies exactly with the case that I have just reported, only it had gone a step farther and the organ not only was non-functionating but also in a state of fibrosis. Furthermore, there is no reason why the other kidney or the rest of the body should be involved if no functionating renal tissue remains in the involved organ.

CASE III. To show another variety of non-func-

tionating kidney I will speak of the case of a patient, an Italian laborer, who came to the clinic complaining of great frequency of urination day and night. He was very much emaciated and was running a septic temperature. A mass, which was not well defined, was found on the left side. The bladder trigone was involved with tubercular lesions on both sides, and there was a mass of pus around the left ureter. Catheterization of this ureter gave simply a few drops of pus. A diagnosis of perinephritic abscess was made. A small incision was made and the pus evacuated. An opening was found going into the kidney where the abscess in the kidney had opened. After a few days I opened the wound and made further exploration and cut through the convexity of the kidney into the pelvis. The tubercular infiltration was so dense that there was practically no bleeding during the nephrotomy. The operation may not have been warranted and I decided not to remove the kidney, although it appeared useless to me, for fear the patient would not stand the operation. I put a drain down to the kidney, placing the end near the opening of the abscess in the kidney. This patient's condition did not improve, but grew steadily worse and he died. Autopsy showed the other kidney to be involved in the same tubercular process. It is hard for me to say with so limited an amount of pathological knowledge what would have taken place if this patient had had a single tubercular kidney. Would there have been sufficient healthy tissue remaining after a further breaking down of the kidney or the absorption of the infiltration to take the pressure off the parenchyma to such a degree as to allow a part of it to functionate again? This may have simply been a temporary non-functionating kidney, but even in case that it was it was an interesting one to study.

CASE IV. Another patient who came to me some years ago was a very interesting case to study, as all of the subjective symptoms were on the right side and there were none on the left nor was there any history of subjective symptoms on the left side. On the right side the patient had great tenderness and great muscular rigidity, so that the kidney could not be outlined. On the left side there was no pain, no tenderness and no muscular rigidity, and the kidney could also not be outlined by palpation. Cystoscopy revealed tuberculosis of the bladder. The ureters were catheterized and normal colored urine of low specific gravity, containing a small amount of pus, traces of albumin a few hyaline and granular epithelial casts (no pus casts) came from the right side. On the right side when the catheter entered the kidney about two ounces of white fluid, which resembled water with pus in it, escaped, showing that the patient had urinary retention on that side. It was decided that an operation was necessary in this case, although it might have been better to have allowed the patient to go without it. Trusting to improvement of the lesser involved kidney on the right side I decided to explore the left kidney, making a diagnosis of pyonephrosis. The kidney was very large, but could not be felt before the operation on account of its collapsible walls. I made an incision in it (nephrotomy) and it appeared to be totally destroyed. There were simply a large number of pus cavities with no healthy tissue. The liquid contents were practically water and pus. As far as the water alone was concerned there must have been considerable secretion there but no solids. This was a case of non-functionating kidney unless the water which came from the kidney and was contained in the pelvis could be considered the result of active renal function. There is no question in my mind but that the water which was present in the kidney at the time she was cytoscoped would have ceased to be secreted in a few weeks, leaving nothing but pus and scar tissue in the organ.

CASE V. The most beautiful specimen of the multiplicity of tubercular processes in the kidney, accompanied by a marked illustration of non-functionating kidney, was that of a patient who entered the Columbus Hospital a few years ago. This patient was 27 years of age and a laborer. He was in a critical condition. He had great frequency and great difficulty in urinating. His prostate was enlarged and very much indurated. The left kidney could be outlined and the right not. The surgeon on duty told me that he was going to remove the man's prostate. I told him that he could not do so unless he used a hammer and chisel, that it would cause the death of the patient, and that in any case the patient could not live but a few days as it was evidently a case of tuberculosis. On cystoscopy a tubercular process was seen in his bladder around the trigone and the ureters. It was impossible to catheterize the right ureter. The left was catheterized with ease and considerable urine and pus came through the catheter as soon as it was entered, showing dilatation of the pelvis with renal retention. The patient died in a few days, and specimens of his urinary tract were taken at autopsy. The left kidney was about one-third the size of the right. The pelvis was dilated although the kidney was smaller than normal. There were two tight fibrous strictures at the junction of the pelvis and the first part of the ureter and near the bladder there was a dense tubercular infiltrate and not even a filiform would pass through the ureter after its removal. This was a clear case of the shutting off of the ureter by strictures and by a dense, quickly infiltrating tubercular process, and a consequent rapid atrophy of that kidney from pressure. On the other side the obstruction of the ureter was not so great, but sufficiently great to allow a dilatation of the pelvis and enlargement of the organ. The right kidney was absolutely non-functionating. Had the right kidney been absolutely normal and capable of carrying on the urinary function for some years the left kidney would itself have undergone slow process which would have made it non-functionating in time.

CASE VI. Some time after this we had a case in the hospital of a woman with pain on the right side, where a tumor could be palpated. The urinary examination showed renal elements, some albumin and a few casts, but no evidences of tuberculosis, tumor or stone. Cystoscopy showed only a mass

of pus hanging from the right ureter. Catheterization of both ureters gave us simply pus and a few crystals on the right side. From the left side we obtained a few casts and traces of albumin—otherwise the kidney was normal. The diagnosis of a practically destroyed right kidney probably containing a calculus was made. Operation revealed a very large kidney with a very marked non-suppurative perinephritis. On opening the kidney a calculus was found. The organ was a pus sac and there was no functionating renal tissue. It was removed.

CASE VII. This was the case of a patient who entered the hospital with a pus sinus in the right loin following an abscess which had discharged in the lumbar region some time before. Catheterization of the ureter on that side gave us a few drops of pus. On the left side the urine was practically normal. An incision was made from above through and below the sinus and the loin was opened. A finger inserted detected a stone which was lying outside of the kidney in the perirenal fossa. The stone was taken between the thumb and forefinger and removed without resistance. I then tried to loosen and deliver the kidney. Adhesions were so dense in front that I was afraid I might injure the vena cava. I therefore cut down through the convexity of the kidney into the pelvis as there was a sinus on the outer side of the kidney. We pressed upon the pedicle as well as we were able. On performing this exploratory nephrotomy there was not the usual bleeding which occurs even when the pelvis is compressed by the fingers. The hold on the pedicle was relaxed ond there was still no hemorrhage. I removed the posterior half of the kidney. I made two elliptical incisions about the sinus, washed the wound with peroxide of hydrogen, closed the wound and inserted a cigarette drain. I allowed the drain to remain two days, when I removed the same and the wound closed. This was not a non-functionating kidney, but there was no circulation in the organ, due probably to a *fibrosis*.

CASE VIII. The next case was that of a man about 5 feet 6 inches tall, weighing, I should judge, 240 lbs., or more, whom I was called to see by Dr. Tomasolo. The patient had not passed any urine for five days. His bladder had been rapidly repeatedly catheterized during this time and diuretic remedies had been given him. The patient was lying calmly and placidly in bed reading a newspaper. I asked him how he felt and he replied that he felt fine. He had no pain or discomfort. He said he had had some pain when he ceased voiding his urine three or four days before. On examining him I found no tenderness over the left or right side, and neither kidney could be palpated. I elicited the information that some years before he had pain on the right side which was quite severe and that he went to Roosevelt Hospital, where he was put to bed, examined and scheduled for operation. On feeling a desire to urinate he voided and passed two small stones, after which the pain disappeared and he left the hospital. He had a few dry rales over his chest. I sent him to the hospital as an emergency case. Cystoscopy showed a normal bladder and no urine coming from either side. The ureteral catheter on the right side went up to the pelvis of the right kidney, but no urine came away. On the left side it stopped after entering for a few inches. The condition was one of complete anuria with a probable non-functionating kidney on the right side. The patient was placed upon the table and an incision made in the lumbar region through an enormous amount of fat down to the kidney. The kidney was found to be greatly enlarged and a nephrotomy incision was made into the pelvis. This was followed by a great rush of urine and blood. A drainage tube was placed in the pelvis of the kidney and the sides of the kidney incision were brought together above and below it. The patient passed a very great amount of urine through the tube and in three days began to pass urine through the urethra. This gradually increased in amount and that coming from the kidney through the wound decreased until the wound finally healed. On again performing cystoscopy and catheterizing the ureters the bladder was found to be normal, with a very free flow of urine from the left side, and on the right side the catheter again went up to the pelvis, but no urine came away. It was a case of non-functionating kidney. In talking this matter over with the pathologist of the hospital, it appeared from former experiences that a patient may have a calculus in one of his kidneys; that this calculus may set up a suppurative process; that he may then pass this calculus through the ureter and urethra, but that the suppurative process may not be cured by this means and may continue until the functionating renal tissue has been entirely destroyed. This operation was performed six years ago and the patient is still living and in good condition. While dictating this history a physician in the office asked why I did only one operation—why I didn't operate on the non-functionating kidney and remove it. The answer is, why should we remove a kidney that is doing the patient no harm. If there is a retention of pus in this kidney which is giving rise to a septic condition then it would have been removed, but the suppurative process had entirely ceased. The history of this case shows how important it is in a case of anuria to open the kidney in which the retention of urine occurs. The pressure of urine in the ureter and renal pelvis having been removed by operation there was evidently less spasm about the stone and it descended into the bladder and was passed out through the urethra.

CASE IX. Shortly after this a woman entered the hospital who had not passed any urine for some time and who had no urine in her bladder. She also had pain on the left side, but here a tumor could be felt in the renal region. Cystoscopy showed a normal bladder. Catheterization of the right ureter in her case brought away no urine, whereas on the left side, although the catheter went up near to the kidney it met with an obstruction. The patient was prepared for operation, a lumbar incision was made on the left side and the kidney was found to be a large grayish-yellow, greasy

looking mass, which, however, could be easily freed excepting above. It was quickly seen that this was probably a case of non-suppurative perinephritis. An incision was made through it which revealed an amalgamation of the capsula propria and the external capsule. The pedicle was clamped and the kidney was opened into the pelvis (nephrotomy) and a stone was removed from the upper part of the ureter where the pelvis opens into it. After the operation the patient drained for about three weeks through the tube in the left kidney and she also regained somewhat the urinary function in the right kidney which had been temporarily suspended and had been considered a derelict. The obstructing stone was about ½ inch long and 1-3 of an inch in width.

CASE X. A girl 21 years of age was admitted to the Columbus Hospital on account of pain in the right side, which she felt the day previous, but from which she had not suffered for eleven years when she had had a very severe pain on the same side lasting two or three days. She was not running any temperature. The bladder was cystoscoped and appeared to be normal. Catheterization of the ureters revealed a normal kidney on the left side and on the right side no urine came away. The kidney was delivered and proved to be of small size. An exploratory nephrotomy revealed a blood clot in the non-functionating kidney. The kidney was removed and taken to a pathologist, who said that, in his opinion, the kidney had been destroyed by a renal calculus which caused the pain that she complained of 11 years ago, which had either caused a renal retention giving rise to pressure atrophy at the time, or else the calculus had given rise to a suppurative condition which continued after she had passed it until the organ had been destroyed. Why the blood clot formed I do not know, but it was probably due to traumatism. It shows that the vascularity of this kidney, even if the urinary function had ceased, was fairly good.

CASE XI. Another case of renal calculus giving rise to pyonephrosis and destruction of the kidney was that of a woman who came to the hospital complaining of dyspepsia and malaria. A very large kidney could be palpated on the right side. She had suffered for some time from indigestion and so-called attacks of malaria. The indigestion was thought to be due to the pressure or pulling of the kidney on the abdominal plexuses and large or small intestine, and the attacks of malaria were evidently attacks of sepsis due to occasional absorption of pus where the ureter was shut off by a calculus in the pelvis. Sometimes she passed clear urine and sometimes turbid. The clear urine was evidently passed from the left kidney when the right ureter was occluded and when there was no drainage of pus from the right kidney. It seemed that the left kidney was sufficiently healthy to carry on the renal function. The right kidney was cut down upon showing a very large organ. This was removed and then opened. It was found to contain about a pint of pus and several very large calculi, some of which were branched. When the retention of pus took place in the kidney it was due to one of these stones, which was a combination of two others, that became impacted in the ureter. When, however, the pressure of the gathering pus in the urine was again sufficient to dilate the pelvis, the ureter opened and the stone disengaged. The kidney, after the removal of the stones, was a mere shell and appeared to contain no functionating tissue. There may, however, have been a small amount of functionating tissue present not discovered, but, if so, it couldn't have lasted but a very short time. I considered it a case of non-functionating kidney.

CASE XII. Only a short time ago one of the best instances of non-functionating kidney came to me as a case of anuria. She had passed no urine for some time and no urine was found in the bladder. She complained of severe pain on the left side from which she had suffered for a number of days. On the right side there was an enlarged kidney, but no pain. She was running a septic temperature. On cystoscopy she showed quite a marked cystitis. There was a large mass of pus hanging from the right ureter. The left kidney did not appear to be secreting, but after passing a catheter up, it evidently dislodged a calculus and some urine came away. The right ureter could not be catheterized. The patient was such a marked emergency case that we could not take time for further study of her case. The tumor on the right side was harder than that on the left and it appeared to me that it was probably the most involved. On the left side the organ was larger and gave rise to the pain from which she was suffering, and she had furthermore been sent in for operation on that side. I stated before operation that I believed I should cut down on the right kidney, but if I did and the patient had a fatal issue I thought I would be blamed for so doing, and that I would first operate on the left side, which gave operative indications. A lumbar incision was made and a large kidney was delivered, a nephrotomy incision made into it and five small, tooth-like calculi were removed. Some were in the calyces and others were in the pelvis, where it enters the ureter, one of which was engaged in the upper part of the ureter and had evidently been the one which had given rise to the anuria and which was dislodged by the catheter but had quickly come back into place when the catheter was removed. These stones were removed and the patient's kidney drained for some days. The right kidney had meanwhile given rise to no symptoms excepting that, perhaps, the temperature which she was running could be traced to absorption of pus from this organ, although there was sufficient involvement of the left kidney to account for it. An incision in the right lumbar region was made and an enormous kidney was brought into view. It consisted of a large number of lobulations extending from the diaphragm down into the lilac fossa where the end was turned toward the median line. It was 11 inches in length and somewhat collapsible. The different lobulations were aspirated, one after the other, each containing four or five ounces of pus. Calculi could then be felt in the pelvis and calyces. These were

cut down upon and removed. It was found that the anuria on that side was due to a large curved calculus which was jammed into the ureter. There was no functionating tissue apparent, although the kidney was not removed.

(Cases of tuberculosis of the kidney which are non-functionating are of many different varieties. It may be the result of infiltration where the kidney has been so packed with the tubercular infiltrate that the blood vessels and tubules are pressed to such a degree as to incapacitate them; or it may be the result of a very acute secondary involvement, forming pus cavities and rapidly destroying the organ; or it may be due to involvement and narrowing of the ureter, either through stricture formation or else through such a rapid tubercular infiltration into the ureter that the lumen is shut off. A stricture of this last variety may give rise to sudden renal retention of urine which in turn gives rise to sufficient pressure on the parenchyma of the kidney to cause pressure atrophy. It is said that 50% of the cases of tuberculosis of the kidney are unilateral. This may be so, especially in the first stages of the kidney, but if the disease exists for a long time it is liable to involve both. The degrees of inflammation and destruction of kidneys may be different on one side from what they are on the other. The cases I have mentioned show what the cause and appearance of non-functionating kidneys are. It is said that tuberculosis is more liable to occur in the kidney than in any other part of the urinary tract, and that when the bladder is involved it is almost always secondary to involvement of the kidney; in fact most cases that apply to me for treatment who have tuberculosis of the kidney complain of bladder symptoms such as frequency of urination, pain and tenesmus rather than of any symptoms in the kidney region.)

There are several indications of non-functionating kidney. A large, thick mass of pus over one ureter or hanging from it as seen by the cystoscope points in cases in which no urine is seen coming out of the ureter, to a non-functionating kidney. This is more strongly indicated if a catheter meets with a ureteral obstruction.

If crystals are found in the urine it points to the presence of stone. When there is but little bleeding in cutting into a kidney it also points to a non-functionating organ.

The presence of only a few drops of pus on catheterizing the pelvis of the kidney is another evidence of such a condition. A kidney can become non-functionating by stones that block the ureter to such a degree that no urine can pass through it. The attack of renal colic that caused pain and destroyed the kidney may have taken place so long ago as to have been forgotten.

The most interesting feature of non-functionating kidney is that it is a predisposing cause to anuria. Such a kidney has usually been destroyed by stone, although it may have been destroyed by tuberculosis, but in either case if a stone blocks the other ureter the patient will have an attack of anuria, when vigorous measures must be taken.

Anuria is the most serious emergency condition in renal surgery. In such a case the kidney on the side of the obstruction should be opened along its convexity into the pelvis, thus relieving the pressure. There is no need of removing a kidney that is non-functionating unless it is septic, and gives rise to pus absorption.

DEBATABLE FACTORS IN THE SURGICAL DISCIPLINE OF RENO-URETERAL TUBERCULOSIS.*

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From the clinical standpoint three periods arbitrarily characterize the development of the surgical discipline of renal tuberculosis. The first antedates the use of the cystoscope; the second is contemporaneous with its application, and the third is the present, which marks the maturation of our experience, and is epicritical thereof.

In the first period, only such cases were operated upon that presented themselves as tumors, associated with constitutional and urinary disturbance, naturally very advanced forms of tuberculosis. These are merely of historical interest and as such were included in the statistics of v. Schmieden in Germany, and Garceau in France, who independently assigned a mortality of 29% for the nephrectomies performed therefor.

The second period, synonymous with cystoscopy and ureteral catheterization, established the unilaterality of the affection, thereby advancing the operation of nephrectomy to the more early forms of the malady, with a consequent drop of 50% in the operative mortality, as evidenced in the early statistics of Israel and Küster—11.3% and 11.7% respectively.

In the third period we again find a decline by 50% more, quoting Rovsing, 3.8%; Kummel, 5%; Zuckerkandel, 7%; Wildbolz, 2.8%. It is this present era, therefore, that we should scrutinize in order to still further delimit and define the possi-

*Read before the Genito-Urinary Section, New York Academy of Medicine, Feb. 19th, 1913.

bilities of surgical intervention. Be our attention directed to the nephrectomy itself, to the care of the pedicle, or that of the ureter, the after-treatment of the bladder by local or constitutional measures, we find our results vitiated in proportion to the lateness of the recognition of the tuberculosis. Thus Wildbolz is moved to say "that the diagnosis of a renal tuberculosis in all its detail is conducted at the expense of great patience on the part of the physician and pain to the patient."

The question has often been raised, what constitutes an early diagnosis. It would appear that there could be but one answer—the finding of the tubercle bacillus. Yet this is so elusive that we read in the testimony of Gerster that only in 30% could the organism be found in the urine and that in conjunction with the constitutional data of history; "especially and in most instances the diagnosis was based on the presence of typical ulcers of the bladder." Küster and Wagner are, too, of the opinion that only in 10% to 20% are the tubercle baccili to be detected. Rövsing attributes this to faulty technique and places his findings with Forell's method as high as 80%. Wildbolz also claims to find the organism in 80% to 90% of the cases, and that resort to animal inoculation is rarely necessary. Be that as it may, would we be justified to regard the findings of tubercle bacilli in the urine *per se*, as paramount to a diagnosis of renal tuberculosis? It has been contended that in that event we might be dealing with a bacilluria, an elimination of the organism from some extra-renal focus as the lung. There is some evidence in this direction, but only in cases of advanced pulmonary tuberculosis, which may, for practical purpose, be disregarded. To offset all this, T. Brown reports a case where, upon the finding of bacilli, and in a urine void of pus or red blood cells, he nephrectomized the impugned kidney, and upon section found it diseased in its interior. This is really a precocious stage, and a very similar finding I reported in the *Annals of Surgery*, 1909.

Attention has been directed by various authors to a condition of slight albuminuria antedating by many months the outbreak of the symptoms of renal tuberculosis, and I recall a female child whom I operated upon for renal tuberculosis, whose younger sister subsequently developed albuminuria, and in which after many months tubercle bacilli were found. She died of miliary tuberculosis. Rovsing has seven times in two hundred instances established such a diagnosis on the finding of albuminuria. Keersmacker, of Antwerp has described albuminurias with a sclerotic type of kidney, without the formation of tubercle, dependent on the tubercle bacilli. Our fond hope, therefore, in the matter of early diagnosis, though somewhat shattered, nevertheless centers itself in advancing to what may be termed a precocious stage of tuberculosis of the kidney, mindful, however, that tubercle bacilli cannot be found until the focus breaks into the pelvis.

Primary nephrectomy is the order of the day and materially lowers the mortality, but there are instances, such as large pyonephrotic sacs in individuals depleted in strength, which must be drained and then removed; nor is it to be overlooked that a calculous pyonephrosis which is being drained in the hope of conservation will have to be radically dealt with at a disadvantage at the later day, when tuberculosis is detected. Hence the caution—always add a search for tubercle bacilli in case of calculus pyonephrosis.

Hemorrhage, primary or secondary, heads the list amongst accidents incident to a nephrectomy. Therefore, that incision which will give the freest exposition of the kidney and its pedicle to permit of the former's safe removal, is commended. A small oblique incision to start, will suffice; this may have to be extended forward or bisected vertically upwards, including the resection of ribs, if the exigencies demand. All further progress and conduct depend upon the extent to which the infiltration has extended into the perirenal tissues. The easiest and most surgical procedure, if mobilization and luxation of the kidney are feasible, is ligation of the individual vessels; and access to the vascular radicle will often be facilitated by first disposing of the ureter. In fact, where the vessels cannot be identified and isolated owing to their being imbedded in the infiltrated fat, isolation of the ureter lower down will be a guide to these, which under such circumstances should be tied *en masse* with a stout silk ligature.

Nicolich claims that in nephrectomy for all conditions, hemorrhage resulting from a slipping of the ligature added greatly to the mortality, for which reason, where the pedicle has to be treated *en bloc* he resorts to forcipressure, the instruments being left in for three days, by which time thrombosis is complete. Finally when the kidney cannot be at all mobilized to get at the pedicle, we may still effect a pedunculation by the subcapsular method, shelling the kidney out of its fibrous capsule as in Edebohls' decortication, and then clamp all the structures distal to the hilus, leaving the clamp *in situ* or ligating with heavy silk, or, still better, passing about the pedicle a solid round rubber cord of

purest gum one-sixth inch thick; while this is on the stretch (previously tested) the limbs of the cord are crossed and secured by a length of stout silk ligature at their intersection. The recoil of the rubber acts by elastic compression in obliterating the lumen of the vessels and with the lapse of time —several weeks—it cuts through the pedicle. With any of the aforementioned ligatures, to still further safeguard against slipping, leave much tissue redundant, for it will eventually slough away. The silk and rubber ligatures extruding from the wound may be drawn upon from time to time to facilitate their coming away.

A second death-dealing operative complication is injury, combined with infection of the peritoneum. A third lethal operative sequel is septic or tuberculous infection of the entire wound. Both of these it is within our province to repress by exercising great care that kidney content does not escape and contaminate. It is this incident which has raised the dignity of the findings of ureteral catheterization to that of an axiom. "Tubercle bacilli by ureter catheter precludes any further confirmation by exploratory nephrotomy." As in the removal of tuberculous glands, we should aim to remove where possible the capsule investments of the kidney.

The toilet of the wound is yet a matter of controversy and involves the care of the ureter. Two widely divergent opinions within very recent times have been handed down to us. Thus Gerster is of the opinion that drainage, too much rather than too little, is safest, whereas W. J. Mayo is an advocate of complete closure of the wound without drainage. "Where soiling with the escaped tuberculous material has occurred, he cleanses the wound with a saline solution and fills it with as much as a quart thereof, believing that it facilitates absorption of the material infected with the *attenuated* organism before favorable conditions are established that would increase the virulence of the organism."

The handling of the ureter has been subject to many ups and downs. It was long the contention that as the bladder lesions healed spontaneously after nephrectomy, so would the ureter, but extended experience does not warrant the acceptance of such an unqualified corollary. There are those who would sew the ureter into the wound and treat it with caustic agents, Rövsing. Schlaginweit seeks to destroy the interior subsequently by electrolytic currents. Israel is selective in his treatment and has extended his incisions parallel to Poupart's ligament to extirpate the ureter to the bladder. In 1910 Longard advised extirpation of the ureter through an independent incision parallel to Poupart's ligament. By traction on the ureter, which is left *in situ* with the kidney, one is readily enabled to identify it and thus effect its removal without opening the urinary tract at all. Lilienthal has independently conceived a similar procedure, the difference being that the ureter is divided and into the distal end a stiff instrument is introduced as a guide. The ureter can then be followed down to the bladder and even the vesical end extirpated.

Reverting for a moment to the sequel of ureter tuberculosis, Israel asserts, on the basis of 1,013 cases, that spontaneous cure is the rule; that 11.5% result in fistulæ, the greater number of which heal in four years; that the method of treatment exerts no marked influence on the frequency of these fistulæ, which followed in 10%, whether with burial of stump or when total extirpation was resorted to; and in 16% after suture of the ureter into the wound and carbolizing its interior.

The laissez-faire attitude towards a solitary renal tuberculosis, in the expectation of a spontaneous cure, is a bit of sophistry. Thus Ekhorn, Waldschmidt, Riehmer and Albarran record a number of cases which were judged to have gone on to spontaneous cure, subsequent removal of the kidney was necessitated and revealed a latent and torpid tuberculosis. The argument that pervades all investigations is that, biding the long time it takes to effect a spontaneous cure, the bladder becomes seriously compromised and the patient is a martyr to years of great suffering and is in imminent danger of a spread of the tuberculosis to the opposite kidney, or elsewhere in the human body.

The bladder is the barometer of the kidney status. Departure of the vesical function, increased frequency of urination, painful micturition and diminished capacity, all too familiarly mark the onset of renal tuberculosis.

Antedating ureter catheterization, Willy Meyer described intravesical lesions metaphorically—"likened to footprints in the snow." Fenwick, on the appearance of the ureteric meatus, judges the kidney; and Gerster in most instances was guided in his diagnosis by vesical ulcerations.

Following renal extirpation, the bladder behavior and appearance are again barometric of the end-results. Thus, in the monumental and searching statistics of Israel, following nephrectomy, micturition became normal in 75% of cases; tubercle and other bacilli persist in the urine in 63% and non-tubercular intravesical lesions in 43.5%; and the urine is not wholly normal in the majority.

We are now prepared to strike a balance in terms of our end-results as to the degree of efficiency ob-

tained by our surgical discipline in concluding with these statistical data:

	Nephrectomies.	Deaths.
Krönlein	71	5%
Zuckerkandl	104	7%
Albarran	118	3.3%
Wildbolz	139	2.8%
Rovsing	145	4.8%
Israel	170	—

These mortalities are *post-operative,* and occurred within a few weeks after the operation, whereas if a census of operated survivors is taken at the end of six months, as was done by Israel, incorporating his 170 cases with others, reaching a grand total of 1,023, the "immediate mortality," so designated, rises to 12% and the "remote mortality," applicable to those who succumb after six months, ascends to 15%. Therefore about 75% of those operated upon are saved. Krönlein, in a period of 18 years, had 14 deaths the first year, within four to ten years after operation. Hence, if the patient survives the first year, his chances of longevity increase.

The beneficence of nephrectomy lies not in its low operative mortality, but in the large number of cures effected, which arose out of the acceptance of the teaching that early renal tuberculosis is unilateral, and from the application of sound anatomical and surgical technique, to the exclusion of the renal functional efficiency tests, other than catheterization of ureters and urea and specific gravity estimates—for amongst the causes of death conspicuous by their absence, is renal insufficiency. On the other hand, conspicuously represented as a mortal complication is general miliary tuberculosis which, according to Israel, represents 31% of the deaths, after nephrectomy. This factor is not chargeable to operation, for recent statistics show that it is naught but a predisposition of the uripoietic tuberculosis. For Blum and Müller at the Vienna General Hospital report that of 5,372 cases of tuberculosis found post-mortem, 723 had urinary tuberculosis and 30% of these had tuberculous meningitis, whereas amongst 4,372 cases of pulmonary tuberculosis, only 6% had miliary tuberculous meningitis.

27 EAST 81ST STREET.

Do not forget the favorite site of the varicose ulcer—the lower inner side.

You will have far more success in treating chronic ulcers of the leg if you will first take the pains to make a correct diagnosis, naming the cause.—Bernays' Golden Rules of Surgery.

DIAGNOSIS OF RENAL SURGICAL CONDITIONS.

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CINCINNATI, O.

The diagnosis of pathological conditions in the kidneys requiring surgical treatment depends upon the clinical symptoms presented by the patient plus whatever information that can be obtained by the surgeon with the aid of the microscope, cystoscope and the *x*-ray.

Before any surgery on a kidney is advised or attempted, every means of studying the condition of that kidney should be used. If the surgeon expects to give his patient the benefits and advantages of methods of accurate diagnosis to which he is entitled, he will not subject his patient to operation on "guesswork" diagnosis. Now that we have these instruments of precision to aid us in examining renal conditions we do not live up to our full duties unless we take advantage of them.

When nephrectomy is contemplated, the condition of the other kidney must be taken into account. In fact there may be but one kidney. Morris found from post mortem records the proportion of cases in which congenital absence of one kidney may be expected is one in 2,650. The horseshoe or fused kidney occurs more frequently, about one in every 1,000 cases.

The diagnosis of a single or horseshoe kidney is made with the cystoscope and the *x*-ray. If but one ureteral orifice can be found with the cystoscope it would suggest congenital absence of a kidney on the corresponding side. The mere fact that the cystoscopist does not see the ureteral opening at the first examination is not conclusive evidence that one does not exist. It may be obscured by mucous folds or trabeculæ, or it may be abnormally placed. The intramuscular injection of indigocarmine, which should appear in the urine as a greenish or purplish color in a few minutes, will aid in locating the ureter.

This colored urine can be seen to enter the bladder from the ureter in jets or spurts every few seconds. The combined use of the *x*-ray cystoscope may aid in diagnosing a horseshoe kidney.

The error of removing the only kidney a patient has is no longer excusable, and if the surgeon will examine all renal cases as he should it will never happen. The location of the pathological lesion is not always a simple matter. All of the clinical

symptoms and even the cystoscopic findings may direct one to the wrong kidney, as will be shown by a case reported below (Fig. 1).

The pain may be referred to the opposite kidney through the renorenal reflex arc, and even hemorrhage may come from the "wrong kidney."

The clinical symptoms that arise from surgical conditions in the kidney are *pain, changes in the urine, disturbance of urination and tumor.* Any one or all of these may be present.

Pain due to a kidney lesion may vary in degree and intensity from the slightest discomfort to the most excruciating pain, requiring large doses of morphia to allay it. As stated above it may appear

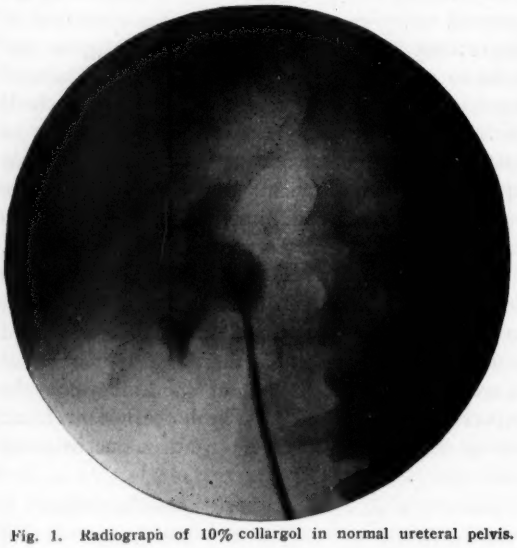

Fig. 1. Radiograph of 10% collargol in normal ureteral pelvis.

in the opposite side, may radiate along the ilio-inguinal and ilio-hypogastric nerves to be referred to the external genitalia, often with greatest intensity in the glans penis. Pain is by no means a constant symptom of a surgical kidney. I have seen cases of renal calculi, large cystic kidney, hypernephroma and large tuberculous abscesses in the kidney without pain and without even tenderness when examined bimanually. Pain due to a calculus is usually intermittent, very severe, and may subside entirely when the patient is quiet.

If the stone is small enough to become engaged in the ureter proper, an attack of "renal colic" follows.

In renal tumors—hypernephroma, sarcoma, carcinoma, cystic degeneration—the pain is seldom very severe and is often practically absent. When present in these cases it is usually more constant than when due to calculus. However, there may be attacks of severe pain in tumor cases, simulating renal colic due to the passing of blood clots through the ureter. Pain may be the *only* symptom and not due to any of the conditions mentioned above. Several years ago a man 40 years of age came to me for persistent and intense pain in the left renal region. All diagnostic methods failed to reveal the cause of the trouble. In desperation and as last resort, surgical examination of the kidney was recommended, which was eagerly accepted by the patient. This was done and an apparently normal kidney was exposed, split from pole to pole, sutured and replaced by a disappointed surgeon. Much to

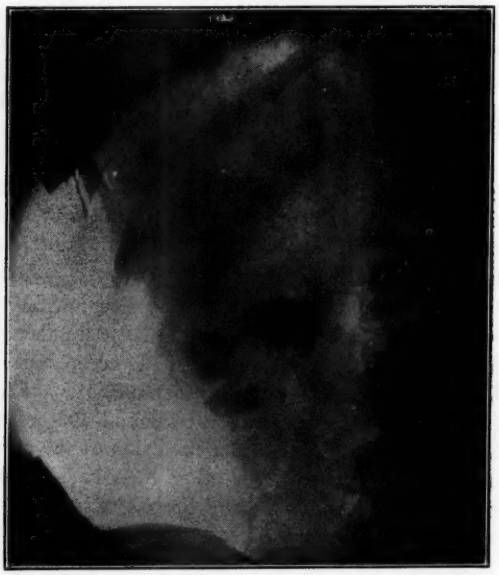

Fig. 2. Renal calculi.

our surprise the pain disappeared with the operation and did not return.

Changes in the urine may be slight as they may be legion. The quantity varies greatly, being either increased or diminished. A damaged kidney may and frequently does pour out large quantities of light colored urine with low specific gravity. On the other hand there may be present a condition of oliguria, a very small amount of urine being secreted.

The *urine contents* are most important and must be studied carefully. In order that this study be of practical aid in diagnosing the case at hand, the urine must be taken from each kidney separately by means of the catheterizing cystoscope. While this is being done the relative quantities secreted by the two kidneys can be observed.

In the urine may be found pus, mucus, blood, bacteria, epithelial cells and portions of tumor. Pus, mucus or blood may be present in such large

quantities that they can be seen macroscopically or in such minute quantities that they are found only after careful centrifugation and microscopic examination. The specimens from both kidneys must be examined with equal care.

After sufficient urine has been collected from each kidney for laboratory examination, the functional kidney test should be made before removing the ureteral catheters. It is just as important to know the functional ability of each kidney as it is to locate the surgical pathology in one kidney. Unless the opposite organ is competent to continue the renal function it is poor surgery to remove a kidney, it matters not how badly damaged it may be. Under such conditions the patient cannot long survive the operation.

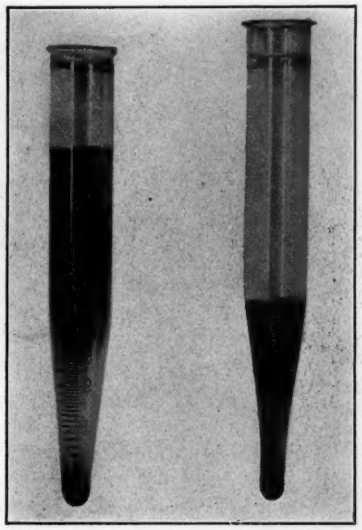

Fig. 3. Fifteen c.c. urine from left kidney, 5 c.c. from right, over the same period.

Pus when present in urine obtained from a kidney through the ureteral catheter, may come from infection of the pelvis of the ureter or from renal abscesses. The most frequent causes are calculi and tuberculosis. Further examination of such cases should be made by a thoroughly competent radiographer and even then certain soft calculi may be overlooked.

The *source of blood* in renal hematuria can be located by the catheterizing cystoscope. If it be from one kidney only the urine from that kidney will be colored with blood, while from the other kidney will be a normal color. The blood may be caused by calculi, tumor, tuberculosis, nephritis, or represent, in a few cases, so-called essential hematuria, the cause of which is unknown. The cystoscope will only locate the kidney from which the hemorrhage is coming, but will not determine the cause.

Microscopic examination of the urine in these cases will not determine the cause in every instance, but may in cases of tuberculosis or pyonephrosis. The hemorrhage as mentioned above may come from the kidney other than the one in which we find the clinical pathology as evidenced in the following case.

Mrs. F., age 50, had been having blood in the urine for about four weeks when I saw her early in January this year. There was a large amount of blood present and upon cystoscopic examination with ureteral catheterization it was found that all of the blood was coming from the right kidney, none at all from the left kidney. At that time we felt quite sure that the pathological lesion was in the right kidney, but *x*-ray examination showed several stones in the pelvis of the left kidney (see Fig. 2). The right kidney's shadow was larger and lower than normal. We advised removal of the calculi as the first procedure in this case, which was done by pyelotomy, without opening the kidney. The incision of the pelvis of the ureter was very near one inch in length, and was not sutured; the kidney was replaced, a drainage tube introduced to the region of the kidney and the wound closed. The patient made an uneventful recovery without urine drainage from the wound. The hematuria disappeared within four days after the operation, which was performed January 14. From that time until now there has been no blood in the urine, and the patient has gained in weight and strength since the operation.

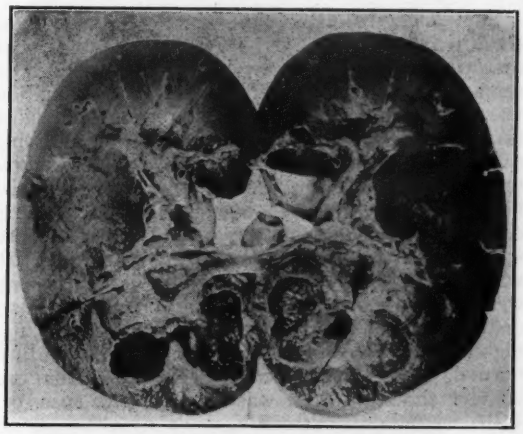

Fig. 4. Lower third of kidney totally destroyed by tuberculous abscesses. Tubercular changes shown in the upper pole of the kidney.

This case illustrates that the diagnostic findings of the cystoscope alone should not be taken as final, for without the aid of the *x*-ray we certainly would have operated upon the wrong kidney.

Disturbances of urination that may be caused from surgical conditions in the kidney are usually

dysuria and increased frequency. There may or may not be present inflammation of the bladder, frequently there is, particularly in cases of tuberculosis of the kidney. In fact, the bladder symptoms may be the only ones of which the patient complains, as is illustrated in the following case.

Mr. E. R., age 18, referred by Dr. J. D. Williams of Catlettsburg, Ky., consulted me February 10, 1913.

As a child the patient had smallpox, whooping cough and measles. Following the measles, he had some ear trouble which left him a trifle deaf. Father and mother living and well. An older brother and a younger sister living and well. No brothers or sisters dead. Uncles and aunts in both parental families have died of tuberculosis. He is 5 ft. 10 in. high and weighs 155 pounds, with a general appearance of being well.

September, 1912, the patient noticed that he was slightly troubled with an increased frequency of urination. This gradually grew worse until December, 1912, when it was so bad and urination was so painful that he was unable to rest but a short time day or night. He was treated at home at this time with internal medication and bladder irrigations. This treatment relieved him somewhat of his distressing symptoms, but at no time was there entire relief. The urine was cloudy and in it there was quite a good deal of sediment. February 10, when I first saw him, he stated that he had lost no weight, his appetite was good, and outside of being disturbed with urination two or three times in the night, he was feeling comfortable. Temperature normal. Examination of the urine taken from the bladder showed that it was slightly acid, spec. gr. 1,016, containing a small amount of albumin, no sugar, numerous pus cells, a few red blood cells, epithelia, no casts. As his only symptoms were directed to his bladder, a cystoscopic examination was made which showed a bladder with a normal mucous membrane around the ureteral orifices; but the trigone and that part of the bladder behind it showed evidences of erosion but no marked ulceration. It was a mild type of chronic cystitis. Catheterization of the kidneys gave us normal urine from the right kidney, while the left produced three times as much during the same period as the right —a left-sided polyuria (Fig. 3). The left kidney urine was devoid of urine color, but was a little cloudy, due to the pus present. Microscopic examination of the sediment in the urine from the left kidney revealed tubercle bacilli on the first slide examined. Examination of the right kidney urine was negative. Palpation over the renal regions produced no evidence of tenderness or pain; no mass could be felt. Upon the strength of the findings in the urine from the left kidney and an apparently normal kidney on the right side, we advised left nephrectomy, which was done February 12, 1913. The kidney was removed extra-peritoneally. The lower third was totally destroyed by tuberculous abscesses (Fig. 4). The remaining kidney excreted 33 ounces of urine the first twenty-four hours after the operation, and has been doing all the renal functions expected of two normal kidneys.

This case emphasizes the fact that a patient may have marked destructive changes going on in a kidney with but few symptoms. Without the cystoscope and the microscope this case could not have been accurately diagnosed, as the only symptom present was increased frequency of urination.

Tumor of the kidney is determined by bimanual examination together with the aid of the cystoscope and the *x*-ray. Ofttimes a tumor is large enough to be palpated, yet the value of surgical treatment in many cases depends upon the detection of the pathology long before the tumor can be felt. The

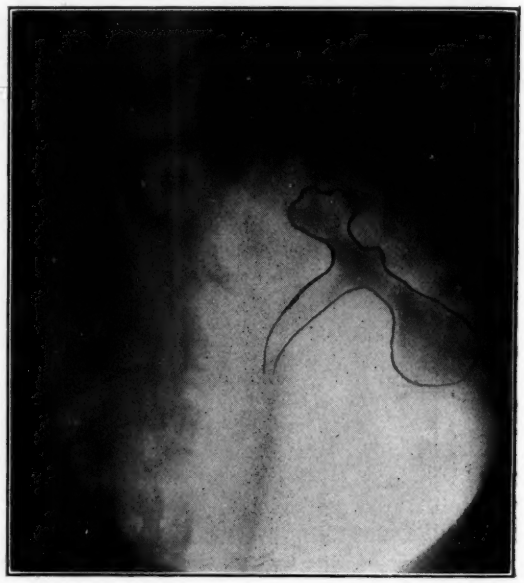

Figure 5.

position, size and outline of the pelvis of the kidney can be shown by radiography after injecting into it, through the catheterizing cystoscope, a 10% colargol solution.

Mr. R., age 42, laborer, physical appearance that of a perfectly well man, came to the service of Dr. Fee at the Cincinnati General Hospital early in January this year with urinary retention. The interne catheteribed him and drew off a large amount of bloody urine. It was necessary to catheterize him several times, and each time there was a great deal of blood. According to the patient's statement this was the first time that he had noticed blood in his urine; he had always been perfectly well and had performed hard labor all his life. I was asked to locate the source of hemorrhage, which I found to be the right kidney. For several days after the ureteral catheterization there was no blood in the urine and had we not decided to have made a pyelograph, we would have overlooked a very important pathological lesion. This picture (Fig. 5) showed the long axis of the kidney to be more nearly hori-

zontal than normal, with an abnormal and enlarged pelvis. From the fact that he had had severe hemorrhage from this kidney and that the pyelograph showed an abnormal condition of the pelvis, operation was advised. This was done by Dr. Fee. A large kidney was removed, showing a large hypernephroma occupying more than one-half of the organ.

This case illustrates the value or the combined diagnostic aid of the cystoscope and *x*-ray, neither of which alone would have been sufficient.

SUMMARY.

The points I wish to particularly emphasize are:

1st—That serious pathological conditions may exist in the kidney and produce few and sometimes no subjective symptoms.

2nd—That no one method of examination will reveal all the facts in renal cases.

3rd—That careful, thorough and symtematic examination of all patients in whom we suspect renal trouble well repays both the surgeon and the patient.

NOTE.—I am indebted to Dr. Sidney Lange for the radiographs.

TUMORS OF THE BLADDER: A NOTE ON THE PRESENT DAY METHODS OF TREATMENT.

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Rather than devote the space allotted to this paper to a consideration of the history of tumors of the bladder, or a resumé of the diagnostic methods employed to establish their presence, I shall simply state that the introduction of the cystoscope has made it possible to diagnose a tumor of the bladder at a much earlier stage than formerly and to observe more closely the different phases of its growth. The symptoms of the condition are late in making their appearance, but the cystoscope findings are positive.

Previous to the introduction of the cystoscope we recognized clinically two distinct types of bladder growth, the semi-benign papilloma of the bladder and the unquestioned cancer. It is true, of course, that many subdivisions of these classes existed, but they were chiefly known to the pathologist and were seen only during the advanced stages of the disease, while the other forms of new growth in the bladder were seldom seen by the clinician. We still recognize these two main groups, but experience has shown us that there are many subdivisions, and also transitional types in which it is impossible without the use of the microscope to differentiate between malignant and non-malignant processes. The principal tumors of the bladder which stand out as clinical and pathological entities to-day are:

The single villous papilloma, which is benign,

Fig. 1. Cystoscopic appearance of the new growth as seen through the cystoscope in the case of large papillomata filling the bladder. It is impossible to remove the cystoscope for enough from the growth to see the base, the finger-like projections as seen, each of which is richly supplied with bloodvessels. This growth was entirely destroyed by three applications of the high frequency spark.

The multiple villous papillomata, which may be benign, but are usually malignant,

The villous growth arising from an ulcer base, which is usually malignant, and

The typical infiltrating carcinoma.

Fig. 2. Shows multiple papillomata of the bladder. These were removed at operation and subsequently after two years recurred. The section under the microscope showed them to be adeno-carcinoma which was destroyed by the bipolar spark.

Of the known malignant types the solitary cancer, and more rarely the multiple carcinomatous

growths, are to be recognized. Those growths which extend secondarily to the bladder wall from the intestine, from the uterus or the prostate, are entirely different in their nature and are not to be considered among the bladder tumors.

After reviewing a series of 25 cases personally treated by me, and studying the published reports of others, my ideas of the proper method of treatment in these cases have radically changed. I have been impressed not only with the rapid and frequent recurrences of carcinoma where a resection of the bladder has been done, but also with the fact that there are many painful and distressing

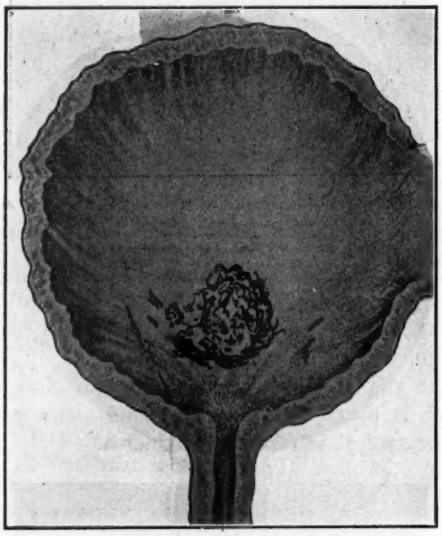

Fig. 3. Size of growth growing on ulcer base when first seen by the writer.

conditions which accompany such recurrences.

Five years ago a wide resection of the bladder containing a malignant growth, or papilloma, offered the only hope of recovery. Since that time, however, the high frequency spark, both monopolar and bipolar, has been introduced in the treatment of bladder growths and has opened up an entirely new field.

I have treated a number of cases of multiple papillomata of the bladder by the high frequency spark with an entire disappearance of the growth and I now use this method of treatment as a routine. An example of this form of treatment follows:

CASE I. A man, 32 years of age, referred by Dr. George Hamlin of Brooklyn. Never seriously ill. Had syphilis eight years ago. Had some strictures of the urethra, which were dilated three years ago, at which time he had some slight bleeding with his urine. This lasted for three or four months. The bleeding stopped for six months and then began again. Blood was always present at the time of urination. Has periods when the blood disappears entirely and then recurs. No pain and no other vesical symptoms. Washing of the bladder has stopped the bleeding and it returned more copiously than before. Urine passed per urethram was thick with blood.

Cystoscopic examination showed a large papillomatous mass partially filling the bladder, situated near and overshadowing the left ureter opening (Fig. 1). A small section was removed for examination. Pathological report—papilloma of the bladder. Growth demonstrated to Dr. Bristow and Dr. L. S. Pilcher, January 1, 1912. Growth subjected to high frequency spark, Oudin current, three minutes, no effect. Bleeding next day very

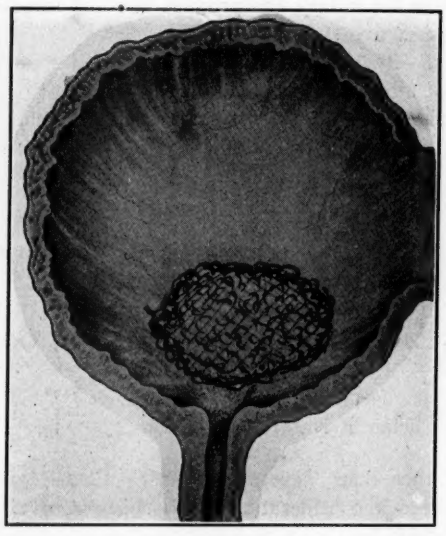

Fig. 4. Size of growth two months before operation.

profuse; patient very anemic. Second treatment, Oudin current, three minutes, on the third day—no effect shown. Third treatment on the sixth day showed the growth almost gone, but bleeding still very severe. Ulcer base thoroughly treated by the spark and the bleeding immediately stopped. It never reappeared. Two months later, cystoscopic examination showed a small bit of growth near the left ureter opening. This was destroyed. Examination two months later showed the bladder to be entirely free from all growth and the patient is well at the present time.

In dealing with recurrent growths, where new growths appear in their original form or spring from an ulcer base left after extensive removal of a tumor, we have found the D'Arsonval current, the bipolar high frequency spark, has given us unexpectedly good results, and has brought about complete recovery after every other means of treatment has failed. An interesting example of this follows:

CASE II. A girl 20 years of age was referred to us by Dr. George Forbes of Astoria. Four years ago she was operated upon for appendicitis and

peritonitis. One year later she noticed some blood at the end of urination. Dr. Osgood of New York examined her; he made a diagnosis of multiple papillomata of the bladder. She was operated upon by Dr. Elliot of the Presbyterian Hospital in 1909. A suprapubic opening was made and the growth thoroughly removed. The after-course was stormy and she remained in the hospital for 13 weeks. In June, 1911, it was found that a hernia had occurred through the operation scar, and she returned to the hospital where a repair of the hernia was done and at the same time she was treated by Dr. Osgood, who curetted a large ulcer at the base of the bladder, which refused to heal. Three weeks after the last operation blood appeared

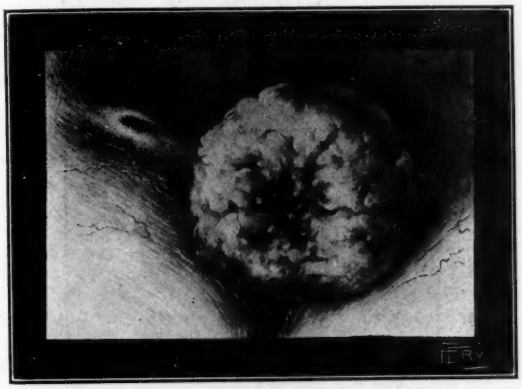

Fig. 5. Appearance of growth through the cystoscope accurately drawn when demonstrated at our clinic April 2, 1912. The growth has become almost twice the size at time of operation.

again in the urine and was present up to the time of her coming under our care.

January 15, 1912, cystoscopic examination showed one large and several daughter papillomata on the base of the bladder just to the inner side of the right ureter opening (Fig. 2). Dr. Osgood informed me that the larger growth was springing from an ulcer which refused to heal after the original operation; in other words, an ulcer had been present over two years. The base of these growths is quite broad and probably malignant. Present at the examination, Dr. L. S. Pilcher and Dr. Mewburn of Canada. The growth at the base of the bladder when first seen was not very extensive, but occupied the trigone between the two ureter openings. It had a cauliflower-like appearance and the surface was covered with shreds of necrotic tissue. It was raised up from the base of the bladder from one-quarter to one-half an inch. The main growth was subjected to the high frequency spark of the Oudin current and repeated treatments were given (Fig. 3), but despite this fact the bleeding continued, accompanied by pain and frequency of urination.

April 2, 1912, examined by Dr. Bransford Lewis, of St. Louis; Dr. Hunner, of Baltimore; Dr. Townsend, of Rutland, and Dr. Williams, of Portland. These gentlemen all advised further electrical treatment. However, the growth spread until it covered both ureter openings. Numerous small daughter growths were evident on the bladder wall. Bleeding became so bad that the patient suffered greatly from the resultant anemia. It was decided to undertake more radical treatment. The bladder was opened from above the pubis with great difficulty owing to the two previous operations. The growth, which occupied the entire trigone, was exposed, the superficial necrotic tissue was curetted off and the entire growth was treated with the bipolar high-frequency spark, using the D'Arsonval current. In order to measure exactly the depth of penetration of this current, following the advice of Dr. Squier, of New York, a piece of fresh meat was subjected to the spark (Fig. 6). The spark gap was then regulated so that the depth of penetration was about one-quarter of an inch. This is

Fig. 6. Piece of meat used to test the depth of penetration of the spark. The section with shady lines shows the depth to which the spark penetrated the meat and was the strength used in treating the cases reported.

done, as is shown in the accompanying illustration, the cooped area on the surface being indicated and the depth of penetration shown by the parallel black lines. After thoroughly destroying the growth which occupied the trigone, the numerous flattened growths which were seen scattered over the surface were all treated by the bipolar spark. The bladder was then closed around the suprapubic drain. The after course of the case was very satisfactory. She left the hospital in about six weeks with the suprapubic wound entirely healed and the cystoscopic examination showed the entire surface of the bladder to be healed. Further examination, nine months after the treatment, showed the bladder still perfectly normal.

Perhaps a word of description of this case does not convey to the reader the seriousness of the disease in this patient. The situation of the growth on the trigone over both ureter openings made a resection of the bladder almost impossible. Such an operation would have involved transplantation of both ureter openings. All other forms of treatment had been tried and found to be unavailing. The case appeared to be one of malignant new growth, but a section was not taken for fear of opening up new avenues for infection. The fortunate outcome in this advanced case has greatly encouraged us in the treatment of these difficult lesions of the bladder.

Extensive resection of the bladder in carcino-

matous involvement of that organ has not been as successful as was at first expected. Even where the growth was small, circumscribed and situated on the anterior wall of the bladder removal has often been followed by recurrence. In our own experience resecting the bladder where the involvement has been extensive has been followed by recurrence in nearly every case, and we have abandoned the intraabdominal operation for less radical measures.

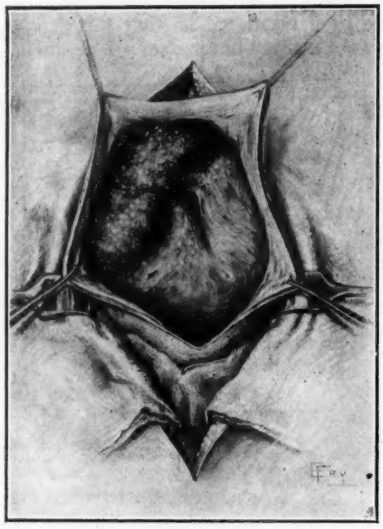

Fig. 7. *Extensive carcinoma of the bladder.* An extensive growth is shown after opening the abdomen, packing off the pelvic viscera with gauze and freely opening the bladder by a vertical incision, including the anterior and superior surfaces of the bladder. It will be noticed that the growth involves the left side of the bladder, more superficially the ostium of the left ureter opening and the first portion of the urethra. This growth also involves the vaginal septum, but not the mucous membrane of the vagina.

The following case is an example of a useless resection:

CASE III. A woman 62 years of age was found to be suffering from a tumor of the bladder, which involved the left ureter opening and the left wall of the bladder, a portion of the trigone, some of the anterior wall and an area extending around the urethral orifice. Vaginal examination revealed a distinct hard mass occupying the vesico-vaginal septum about two inches in length by one in width. An incision was made from the umbilicus to the symphysis, opening the peritoneal cavity. The pelvis was emptied of intestines and protected by gauze pads. The bladder was widely opened on the median line and the growth well exposed. Using scissors, the bladder wall which was involved was detached from the healthy bladder wall down to the urethral opening and the left ureter opening. At the point of exit of the left ureter it was found that the growth was superficial, having extended along the mucous membrane without involving the deeper structures. It had not apparently extended into the lumen of the ureter. The mucous membrane, the submucous structures, and a portion of the muscular tissue surrounding and underlying the left ureter opening, including all of the tissues involved in the malignant growth, were freed and dissected up, the ureter itself not being cut across. By using traction on the flap which had been separated, it was found that the ureter was loosened from its sheath within the bladder wall and could be easily pulled down through the bladder wall. In this particular case over two inches of normal ureter were drawn through the bladder wall into the interior of the bladder. The question of what should be done with the ureter was next to be solved. It occurred to me that a great deal of time

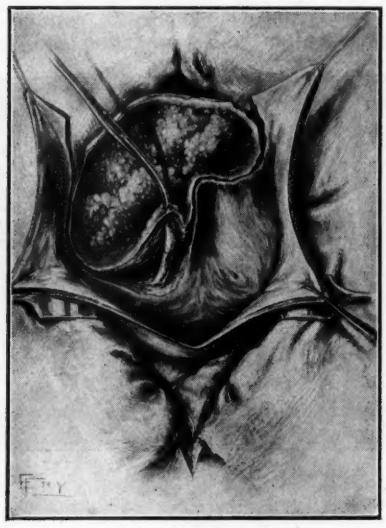

Fig 8. *Extensive carcinoma of the bladder.* Shows the area of the bladder which was removed at operation, including the entire growth, most of the left lateral portion and inferior portion of the bladder, the left ureter opening and a portion of the urethra. The area above the left ureter opening has been dissected up. Here the growth was superficial. In raising up this portion of the bladder wall, including the opening of the left ureter, it was noticed that the ureter itself was pulled through the bladder wall, and about two inches of the lower end of the ureter extended into the wound, free from carcinoma. Instead of transplanting the ureter, it was cut across as indicated in the drawing by a transverse and vertical line about an inch from its ostium, and the severed end of the ureter was allowed to slip back into place, after the end had been slit up about one-quarter of an inch to avoid narrowing of the outlet. There remained then an interval of one-half inch between the cut end of the ureter and the interior of the bladder, and uretero-vesical fistula was established.

would be saved and danger avoided if, instead of transplanting the ureter, the ureter should be cut across *in situ*, about an inch from the ostium, and simply be allowed to slip back into place. This was done, the lumen cut across and the end split up about one-quarter of an inch to avoid narrowing the outlet by cicatricial contraction.

Her recovery was good and she left the hospital with all of the wounds closed, and urinating in the natural way. The patient lived in comfort about six months and then she had a recurrence in the bladder, the vesico-vaginal fistula opened and she succumbed nine months after the operation to a carcinoma involving her bladder and vagina.

These failures led us to adopt other methods of treatment and at the present time we rely entirely on the actual cautery and the bipolar high frequency spark in these cases. We believe that we can obtain better and more permanent results by

avoiding the use of the knife wherever possible. If treatment proves ineffectual through the cystoscope, a suprapubic cystostomy is performed, but no attempt is made to remove the tumor by resecting the bladder. Our present method of treatment consists of destroying the tumor mass by the actual cautery and deep penetration of the base with the bipolar spark. An example of this form of treatment is as follows:

CASE IV. A woman 56 years of age whose symptoms were typically those of cancer of the bladder. A large mass occupied the left wall of the bladder, extending well down to the left ureter, overshadowing it, and reaching to the urethral opening. The patient was operated upon by Dr. L. W. Pearson and myself in March, 1912. An extensive intraabdominal operation was done. The bladder was split and the growth thoroughly exposed. Portions of the growth were removed with forceps and the base of the growth was thoroughly destroyed by the actual cautery. The bladder was closed, and the peritoneal cavity, and a drain left in the suprapubic space. Five days later a suprapubic fistula was established and a satisfactory healing took place. One year after the operation the patient was feeling in perfect health. Cystoscopic examination revealed a considerable deformity of the bladder, the left ureter opening twisted so that its opening into the bladder occupied an anterior position and situated near this opening was a new growth about the size of a hazelnut with an indurated, thickened base. Vaginal examination revealed scar tissue in the vault of the vagina and several adhesions showing that the destructive operation of the year previous had penetrated to the vagina. This new growth was thoroughly destroyed by the D'Arsonval bipolar high-frequency spark of deep penetration, which was administered through the cystoscope with the patient deeply narcotized. The treatment was given at intervals of one week. The present condition of her bladder is perfectly satisfactory, but the ultimate outcome, of course, is uncertain. Nevertheless, the cancerous growth in this case was fully as extensive as in the previous case in which a resection of the bladder was done and which terminated so miserably within nine months; and this patient is symptomatically well at the end of a year, and although she may eventually die of her disease, she has at present no symptom of it.

We realize that the last word has not yet been said on the subject of tumors of the bladder, but we do feel that very great progress has been made. We are opposed to the extensive resections of the bladder in known malignant cases and recommend the use of the cautery and the spark in its place. To-day we can show more living patients who have had new growths of the bladder than at any other period in the history of this disease and we naturally feel encouraged in the belief that the newer methods of treatment are giving us better and more permanent results.

A NEW METHOD OF FACILITATING THE PASSAGE OF DESCENDING URETERAL CALCULI.

(And of Dilating the Ureter.)

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Amongst the methods suggested of late years for expediting the passage downward of descending ureteral calculi, the injection of oil and glycerine into the ureter seems to have attracted most attention. In my own experience, although such injection has at times been followed by expulsion of an arrested ureteral stone, the procedure cannot be regarded as either reliable or even promising. Indeed, after having practiced this method for a number of years in a fairly large number of cases, my former expectations have given way to disappointment. Although the failure to influence the descent of a calculus may have, in some of the earlier cases, been due to an inability to inject the oil or glycerine beyond the calculus, this has certainly not been so of late years, since the adoption of special catheters for this purpose. In the case of impacted calculi low down in the ureter, both for the purpose of oil injection and pyeloradiography, it has been my custom to use ureteral catheters with but a terminal hole, preferably cut obliquely, in order to prevent the reflux of the fluid. If such a catheter be tightly wedged against the obstructing body, we can practically always (even if the catheter be arrested in the lowermost part of the ureter) inject fluid beyond the obturating calculus. Disappointing results after oil injections had induced me, some two years ago, to try dilatation of the ureter by means of catheters and bougies. Thus in a number of cases, two catheters were inserted into the ureter and allowed to remain there for several hours. In some instances this, too, was followed by the expulsion of a calculus, but often no result was obtained. Since the development of my operating cystoscope, whose capacity is about 12 Fr., the introduction of more than two flexible instruments (sometimes three small catheters) was given a trial. Although this method of dilatation was effective in a number of cases, so far as the dilatation of the ureteral orifice was concerned, the disadvantages of the procedure soon become evident after experimental study. The physical impediment against the successful introduction of more than two catheters for

any considerable distance into the ureter was found to be insurmountable. For, although with considerable coaxing, two small catheters could find their way for a certain distance into the ureter, the third catheter would usually be arrested at a point within a short distance from the vesical ostium of the ureter.

Graduated bougies, whose caliber varied from 5 to 12 Fr., were equally disappointing, for they were not applicable in cases in which the calculus had lodged low down, and indeed it is just such stones that require our attention.

In search of a procedure that would more rapidly effect the desired purpose, the electrolytic method of dilating urethral strictures was regarded as possibly giving a clue; and in order to avoid the cauterizing effect of the galvanic current, experiments with the D'Arsonval current were made, the smaller pole being applied to the ureter, the large, indifferent pole to the abdomen. In the very first case in which the procedure was employed, the relaxing and dilating effect of the current was so marked that I at once employed the procedure as a routine, in all cases of ureteral stenosis, by stricture as well as by arrested descending calculus.

The following simple armamentarium was constructed: A No. 9 Fr. silk ureteral catheter serves as insulating material to cover a wire cable, the proximal end of which carries a telescopic coupling for the contact with the high frequency machine, and the distal end of which is supplied with a screw tip for attaching the "dilating metal olives" (Figure 1). These olives (Fig. 2) vary in size from 6 Fr. to 16 Fr., the smallest olive resembling in shape the olivary end of the tip of an ear syringe, the largest olive being flattened so as to permit of exit through the fenestra of the cystoscope.

THE TECHNIC.

With the shaft of the operating cystoscope in the urethra and with a large plate connected with one pole of the high frequency machine * in contact with the patient's abdomen, the telescope of the cystoscope is introduced with the dilating olive attached in the following manner: The catheter shank is fitted with a properly selected rubber cap and introduced into the telescope through the catheter outlet, its screw end projecting a centimeter or more beyond the lens prism. A suitable olive is now selected and attached. The telescope with its olivary dilator is now inserted into the sheath, the olive first entering, the telescope following. When the olive reaches the fenestra, it slips out and the telescope may be locked in place. The bladder is now filled, the olive pulled back into proper place and then made to enter the orifice of the ureter just as a ureteral catheter. Where an obstruction or stenosis has been previously determined, it is well to begin with an olive no larger than No. 6. This is made to penetrate the orifice until it reaches the obstructing point. A current of from 300 to 400 milliamperes is now brought into action, the olivary end being pushed with slight force against the obstructing point. A very few seconds' time usually

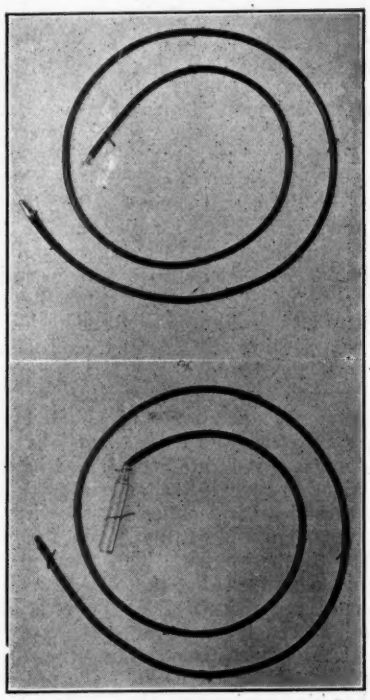

Fig. 1. Electrodes for dilatation; lower picture, electrode with socket for connection with high frequency machine; upper picture, olive attached, socket detached.

suffices to bring about enough dilatation to permit the olive to slip by. The ostium of the ureter, unless it is congenitally small, may thus be dilated in a very few seconds even in cases where the center of the olive is firmly arrested. The telescope is removed, the olive detached and a larger one employed. The process is then repeated. We must remember that the large dilators are flattened in one diameter, so that they must be turned in the proper axis for escape from the sheath.

It is surprising with what rapidity dilatation of the ureteral ostium in the bladder can be brought about, and how quickly obstructions situated higher in the ureter will give away under this treatment.

The following histories in which the electric dilatation of the ureter was employed cannot but arouse

* Possibly the galvanic current may also have the same effect as the D'Arsonval—acting in the ureter just as in the urethra.

the suspicion that this procedure is influential in expediting the passage of arrested ureteral calculi. Although the expulsion of the calculus through the urethra did not occur immediately, but from two to four days—after the ureteral dilatation, enough facts can be adduced from a careful study of the cases to explain the tardiness of this descension.

CASE 1. D. K., 42 years of age, admitted to the Genito-Urinary Service of the Mt. Sinai Hospital, November 6, 1912, complained of having had a severe attack of pain in the left loin five days before admission. His physician had found blood in the urine and had to give a hypodermatic injection of morphine to relieve his distress. In short, a typical attack of ureteral colic.

On November 8th, cystoscopy was done, and the ureteral catheter encountered an obstruction in the left ureter about 4-5 cm. from its ostium in the bladder. Although there was no urinary flow when the catheter was first inserted, a sudden gush of slightly cloudy urine occurred when the catheter was pushed against the obstruction. About 10 cm. were collected in a very few minutes, indicating retention of urine above the obstacle, possibly hydroureter. Oil was injected beyond the stone.

X-ray examination showed a small shadow at a point corresponding to the obstacle in the path of the left ureter.

In view of the findings gained at the first cystoscopic examination, viz., hydroureter and obstruction to the ureteral catheter, and because the oil injection had apparently been of no avail, it was decided to dilate the ureter at a second cystoscopy. On November 15th, the ureter was dilated by means of the olives and the D'Arsonval current. As a preliminary step, three catheters were inserted into the ureter, two being No. 6 Fr. in diameter, the third being No. 5 Fr. Although the first catheter could be passed as far as the obstacle in the ureter (at 4-5 cm.), the second catheter advanced only 3 cm. and the third entered but a scant centimeter. It therefore became evident that very little could be accomplished by means of the ureteral catheters alone, and therefore the olivary method of electric dilatation was applied. Within a very few minutes it was possible to dilate the ureter at the site of the stone to 14 Fr., the calculus having evidently been displaced upward. A No. 9 catheter was then inserted into the ureter and a very copious flow of urine was obtained. Four days later, *the patient returned, having spontaneously passed a stone about the size of a small French pea.*

A critical study of the effect of the use of the dilatation method in this case will bring the following facts to our attention. Although it is always presumptuous to adduce the argument "post hoc ergo propter hoc," in this case, certain definite facts lead to the opinion that ureteral dilatation is of value. Eight days had elapsed since the ejection of oil and the ureteral stone had made no progress downward. On the other hand, within four days after the electric dilatation of the ureter, the stone was passed. Furthermore, whereas the synchronous employment of three catheters in the ureter failed to accomplish dilatation by reason of the fact that the second and third catheters were arrested at points successively lower down, with the olivary method no difficulty was encountered. Then, too, within a very few minutes, an impassable stricture, doubtless due to swelling of the mucous membrane, one which arrested the progress of a No. 6 Fr. catheter, was surmounted by the electric method of dilatation, so that a No. 9 catheter easily passed the obstacle.

CASE 2. B. P., 32 years of age, cap-maker, was admitted to the Genito-Urinary Service of the Mt. Sinai Hospital on July 22, 1912, with the history of having had attacks of left renal pain radiating to the genitals about five years previously, and since then off and on, particularly during the last two months.* A month ago, an attack was followed by the appearance of blood in the urine. For the past three weeks he has been free from pain.

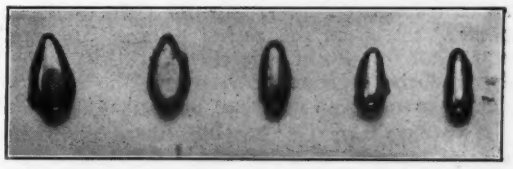

Fig. 2. Dilating olives—natural size.

Therefore this was a case of typical ureteral colic with no evidence of the descension of the stone during the three weeks before admission.

On July 22nd, cystoscopy was performed, the left ureteral orifice being found small and circular, the catheter meeting an obstruction at 5 cm. Six cm. of glycerine were injected beyond the obstruction and the catheter left in for two hours.

July 31st, cystoscopy with the injection of oil: The obstruction was again met in the left ureter 5 cm. from its meatus. Oil was injected without reflux.

X-ray examination showed an irregular shadow 8x5 mm. in diameter, corresponding to the point of obstruction in the ureter.

August 5th, cystoscopy. Two No. 5 catheters were inserted in the ureteral orifice for the purpose of dilatation. The patient was discharged and asked to return for cystoscopy.

On September 23rd, the patient returned to the hospital for cystoscopic examination. The ureter was dilated by means of the D'Arsonval current and olivary metal bougies up to 12 Fr.

Within two days (about 36 hours, according to the patient's statement) he passed a small calculus irregular in shape, of the "rock-candy" variety, measuring about 8 mm. in its greater diameter.

If we review the facts in this case, we will note that no effect was produced by the injection of oil

* Time is calculated from day of admission.

on July 27th; that similarly there was no result after the injection of oil on July 31st; and that dilatation by means of the two No. 5 catheters was also ineffectual for the reason, perhaps, that these could not be passed far enough into the ureter. Furthermore it will be seen that for *a period of nine weeks* (July 22nd to September 23rd) the stone had not moved. *Two days after dilatation with the olivary electric method, the patient passed the stone.*

CASE 3. M. W., 28 years of age, Russian, clerk, was admitted to the Genito-Urinary Service of the Mt. Sinai Hospital, October 10, 1912. For six months he had had vague pains in the right loin with occasional frequency of urination. A week previously, there was an attack of severe colic with blood in the urine. This lasted but a short time and was followed by rather vague pains that were intermittent up to the day of admission.

On October 12th, cystoscopy was performed and an obstruction encountered in the right ureter at a point 7 cm. from the vesical orifice. The ureter was dilated by the electric olivary method up to 12 Fr. and the obstruction overcome, the stone evidently having been displaced upward.

Two days later, October 14th, there having been several attacks of colic after the dilatation on October 12th, the *x*-ray showed that the stone had traveled downward for a distance of about 7 or 8 cm.

On October 19th, cystoscopy was again performed and the affected ureter dilated again, the obstruction being situated 3 cm. from the ostium.

The patient was discharged, and returned on October 24th, *reporting that he had passed the stone four days after the last treatment.*

In this case, therefore, after two sittings, the small calculus which in the radiogram appeared to be 8x4 mm. in diameter was passed shortly after the second dilatation. Even after the first dilatation progress was made, for the calculus rapidly descended, passing downward for a distance of some 8 cm.

CONCLUSION.

Although it would be audacious to claim much for a method which, at best, does nothing more than to dilate the ureter, and possibly stimulate its muscular walls, the observations recorded here, as well as those made of the method in many other cases of stricture, induce me to believe that it may be found of value not only in expediting the passage of arrested ureteral calculi, but also in producing dilatation of the ureter when narrowed or strictured. The ease with which the method can be applied, the fact that it is painless and can bring about greater dilatation than bougies or catheters—these must be regarded as essential advantages. When, through anomaly, the ureteric ostium in the bladder is abnormally small, preliminary meatotomy with the author's endovesical knife or endovesical scissors used through the author's operating cystoscope will be found useful in facilitating the introduction of the first olive.

OPERATIVE TREATMENT OF STONE IN THE URETER.

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The decision to operate for stone in the ureter must depend upon our opinion of the extent to which the integrity of the kidney is being menaced. With our present highly developed technic and exceedingly low mortality it is clearly unwise to allow any considerable menace to the integrity of the kidney to continue after the diagnosis has been made. A stone which obstructs the ureter to any considerable extent will ultimately damage the kidney both by back pressure and by the infection which is likely to result. To my mind, the burden of proof is clearly upon those who would delay operation rather than those who would advise it.

It is permissible to wait in two classes of cases: (1) Those in which the stone is small and can be demonstrated by means of *x*-rays to be making reasonable progress down the ureter. What shall be held to constitute reasonable progress must be a matter of opinion. I should today be wholly unwilling to allow patients to suffer as we have done in the past. I have a vivid recollection of a middle-aged man who for ten days suffered excruciating pain and was kept practically narcotized with morphine and ether before he rid himself of the offending calculus. This seems to me an amount of suffering quite out of proportion to that resulting from operation and involving quite as much risk to the patient. Where the attacks of colic are comparatively brief and progress is being made, delay is justified, but such delay should be accompanied by an armed watchfulness and it is well to remember that colic may subside though the ureter is totally or largely obstructed. The mere cessation of colic is an improper guide, the only safe ones being the radiographic plate and the ureter catheter.

(2) There is a not inconsiderable number of what we might call "chronic" stones in the ureter which have worked their way downward slowly without severe symptoms and which have probably at no time totally obstructed the ureter. In these cases a catheter will usually pass freely to the kidney and they may be compared to those cases of

stone in the common bile duct which occur in the absence of jaundice. In these cases ultimate removal of the stone must be advised unless the patient is totally unable to stand any major operation. On the other hand, it must be clear that no great urgency exists and that various social and financial affairs may be allowed to influence the decision. Nothing more than reasonable delay, however, should be countenanced, as the kidney in these cases is probably always infected and the progress of that infection cannot be assumed to be stationary or even slowly progressive.

Operative Management. Our operative plan should vary with the portion of the ureter occupied by the stone and we may conveniently discuss it under two heads: (1) *Operation for stones above the pelvic brim.* (2) *Operation for stones in the pelvic portions of the ureter.* Here again a subdivision must be made into (1) *Those lying below the iliac vessels but above the lowest two inches of the ureter.* (2) *Those in the lowest two inches of the ureter, including the portion in the bladder wall.*

In the operative management of ureter calculi certain general principles may be laid down. We must have an exposure that will enable us to deal with the ureter freely and without constraint. The ureter must be thoroughly freed so that it can be brought well up into the wound. This is possible except in the lowest portion. In most cases it is wise to place a compression clamp, like a Crile clamp, upon the ureter some distance above the point at which it is to be opened in order to avoid contamination of the wound with probably infected urine. Having satisfied these requirements we come to the actual removal of the stone. Many, perhaps most, authorities advise incision directly over the stone, but with this opinion I am in total disagreement. It may be assumed that the stone has stopped at a point where there is some narrowing of the ureter. It may further be assumed that the presence of the stone has not contributed to the well-being of the mucous membrane at this point and that at least some inflammation exists there. To incise the ureter through this tissue and at the point where it is at least potentially narrowed is in my opinion to invite further narrowing. I believe it to be far wiser to open the ureter an inch or more above the stone. At this point the ureter is almost always dilated and an appropriate instrument, whether forceps or scoop, can then be passed into the ureter and the stone be withdrawn backward, aided by the fingers. Exception must be made for the cases, not in my experience common, in which the ureter is so contracted upon the stone that it cannot be removed without breaking it to pieces. This, however, will not occur in the presence of any considerable dilatation, and where this exists the attack may be made from above with certainty of success. Having opened the ureter and removed the stone it is then essential to demonstrate that the ureter below this point is free from obstruction. Most, if not all, of the cases of persistent ureteral sinus are due to overlooked stricture. This demonstration should be made by the passage of a flexible bougie-à-boule down into the bladder. It is also wise to explore the ureter above, though generally nothing abnormal will be found. Should a stricture be demonstrated it must be freely incised and the vertical incision sewed up transversely so as to increase the caliber of the canal at this point.

The closure of the wound in the ureter seems to me an important part of the operation, and though I am quite aware that in the absence of suture leakage may be quite trivial, it seems to me unnecessary to allow any leakage to occur. If the ureter has been incised above the stone in the dilated portion and if the exposure has been properly made, no difficulty will be found in closing the wound tightly and in the vast majority of cases no leakage whatever will follow. For this purpose I employ double zero plain catgut as I do not think that the apposition need be maintained long. The abdominal wound should be provided with a minimum of drainage and I now employ a single small piece of so-called protective tissue, and close the wound snugly about this. I would at this point warn against the too early removal of this drain. Under the best technic leakage occasionally happens and it is most likely to take place not at once but after several days. I recall vividly two patients, one of whom was under my care, in whom the drain was removed after forty-eight hours. About the fourth day leakage from the ureter occurred, and as the wound had practically closed, considerable deep infiltration occurred, resulting in a long-continued troublesome suppuration. I am generally satisfied not to remove these drains for five or six days.

Choice of Incisions. For stones in the ureter above the pelvic brim (Class 1) an oblique muscle-splitting incision is generally satisfactory. This incision was first proposed, I think, by Mayo-Robson. The skin incision should be made over the course of the ureter, parallel to the fibers of the external oblique, and should be sufficiently free to give access to the deeper parts. When the fibers of the muscle have been separated, those of the internal oblique and transversalis can be separated nearly at right angles to the other wound, giving a sufficient

field if the stone has been accurately located beforehand. This incision may be made high or low, according to the position of the stone, but the majority of stones in this portion of the ureter will be found at the two extremities. The peritoneum can readily be pushed inward, and the ureter isolated, freed and brought into the wound. The advantage of this incision over that which cross-cuts muscle fibers is the rapidity of healing, strength of scar and comfort of the patient. Except in extremely fat patients it is rarely necessary to cross-cut muscle fibers in order to remove stones from the ureter, but it will be observed that this is true only if the exact position of the stone is known before the operation is started.

For stones below the pelvic brim (Class 2) a similar incision, prolonged downward, has frequently been used. This does not seem to me nearly as satisfactory as the incision proposed some years ago by Charles Gibson. Beginning at or across the median line just above the pubes, it follows the curve of Poupart's ligament outward and turns sharply upward just inside the anterior superior spine. This incision cross-cuts no muscle fibers except at its extreme upper end, and this is not always necessary. Gibson advised that this flap be dissected freely upward and that the first incision be then met by another following the outer border of the rectus muscle where the various layers of the fascia split to form the sheath. This gives a triangular flap and an excellent exposure, but the pointed lower inner angle of this flap seems to me to lack vitality, and though it has caused me no actual trouble, I am afraid that sloughing will occur.

I have gotten an equally good exposure by cross-cutting the fibers of the rectus muscle on the side involved about an inch above their insertion into the pubic bone, thereby giving ample tissue in which to place sutures to reunite the ends. Through the incision thus planned the peritoneum is readily stripped back and if the patient be placed in the Trendelenburg position the intestines fall away and give a thoroughly satisfactory exposure of the ureter from the iliac vessels to the bladder wall. In very fat subjects, especially men with a narrow pelvis, the lower inch or two of the ureter is rather inaccessible because of its depth.

For stones situated in the lower inch or two of the ureter this operation is least suited and I think that all of us have a feeling that it should be possible to deal with them by some intravesical method. On the other hand the calculi which lodge just outside the bladder wall at the beginning of the oblique portion usually lie in a little pocket not directly in line with the ureter. Any method of intravesical incision of the ureter which is to reach these stones must incise the whole ureter and the whole thickness of the bladder wall in order to be effective. This has seemed to me unnecessarily mutilating and I have hesitated to undertake it. I have, on the other hand, recently removed a stone situated just without the bladder wall by a technic which seems to me worth further trial. This patient was a very fat man. The bladder was opened in the middle line above the pubes and a metal instrument passed into the ureteral orifice was arrested at about an inch, though the stone could not be felt. The peritoneum was then stripped from the lateral wall of the bladder and the lower three inches of the ureter identified and freed. The ureter was then opened about three inches above the bladder and by passing instruments in both directions the stone was dislodged from its pocket and pushed into the bladder. The opening in the ureter and the wound in the bladder were both closed and no leakage has taken place. This approach seems to me less difficult than that in which the bladder is not opened, as the stone is under better control and the incision in the ureter can be made at a considerably higher point.

I would ask consideration for this method.

PROSTATIC AND VESICAL CALCULI COMPLICATING SUPRAPUBIC PROSTATECTOMY.

H. A. FOWLER, M.D.

WASHINGTON, D. C.

REPORT OF A CASE.

In the course of a suprapubic operation for the removal of an enlarged prostate together with multiple vesical calculi, I encountered, as a complication, numerous prostatic calculi. These were deeply buried within the gland lying between the adenomatous growth and the surgical capsule, and, therefore, had no connection with the urinary tract. In a considerable experience with both the perineal and latterly the suprapubic operation for enlarged prostate, this is the first time that I have encountered this condition. It would appear, therefore, to be relatively uncommon. And this assumption is borne out by an examination of the literature of the past few years. Very few cases of prostatic calculi have been reported, and particularly uncommon are the cases in which this condition has been found associated with hypertrophy of the gland.

While this complication may not be of very great importance from a surgical point of view, it is, nevertheless, of some interest on account of its

comparative rarity and from the fact that occasionally one meets it.

The history of my case follows:

Mr. C. R., aged 60, single, a lawyer, was referred to me by Dr. Sterling Ruffin. He complained of frequent and difficult urination.

Past history: He had had a sharp attack of renal colic about ten years previously, which lasted nearly all day and required morphia. He thinks there was some blood in the urine at this time. He never passed a stone following this attack so far as we know. He had gonorrhea some time after this attack of renal colic, which has recurred two or three times. He has been treated for stricture by instrumentation.

In 1911 he stumbled and fell, striking his knee and side. At the time this was considered of no moment. A few hours later he was seized with an intense desire to urinate, but at first could void nothing. As the pressure became very great he passed a large quantity of blood. The hematuria lasted only a day or two but he was in the hospital for ten days under observation for suspected rupture of the kidney. Shortly after this he had another attack of renal colic, the pain and discomfort in the kidney lasting for several days. No stone was passed and there was no hematuria.

Present History.—For the past year he has noticed that urination is more frequent than normal. This frequency has gradually increased, and recently has been unusually pronounced, on an average of every twenty minutes during the day and five or six times at night. He has also noticed considerable delay in starting the stream which has become more pronounced. There is no pain associated with urination, except pressure and the desire to urinate.

Examination.—The patient is a large, robust man weighing about 185 pounds. His general condition appears to be good, but he shows plainly the effects of the loss of sleep and the distress from the constant attention to his bladder. The external genitalia are normal. Urine is voided with great difficulty in a small stream and without force. Only a small amount is passed at a time, turbid, light in color, acid, and containing a considerable amount of pus shreds. The prostate per rectum is not definitely hypertrophied. The right lobe is normal in size, the left is more pronounced, rounded and smooth. There is a definite sulcus laterally. This lobe is extremely hard. The upper limits can be easily reached and there is no infiltration between the seminal vesicles. The extreme hardness of the left lobe suggested the possibility of carcinoma.

A No. 18 catheter passes readily and 400 c.c. of residual urine withdrawn. The urine is acid, 1,022, negative for albumen and sugar, urea 0.024 (Doremus ureometer). A stained smear showed numerous bacilli. A phthalein test was made the same day. The dye appeared in 15 minutes, and 45% was excreted in the first hour.

Following the first catheterization he was unable to void and for the next few days, all the urine had to be withdrawn by catheter. On two occasions, while emptying the bladder, a small stone was caught in the eye of the catheter and removed when the latter was withdrawn. A cystoscope was introduced and showed two calculi as large as marbles and eight smaller ones in the bladder. There was moderate trabeculation. The left lobe of the prostate projected as a rounded mass for a considerable distance into the bladder, the right lobe was only slightly enlarged intravesically. Withdrawing the instrument into the prostatic urethra, the two lobes were seen bulging inward from each side at the level of the verumontanum, transforming the urethra into a longitudinal slit, at the bottom of which could be seen the verumontanum. There was no malignancy evident from the cystoscopic examination. The condition was apparently one of simple bilateral hypertrophy with marked intravesical projection of the left lobe, and complicated by multiple vesical calculi. I had never before felt a benign hypertrophy presenting such an extreme degree of induration, and this condition, which appeared to be confined to the left lobe, was not explained by the examination up to this point.

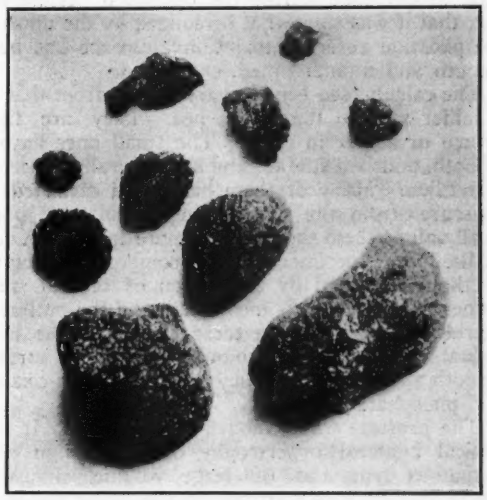

Fig. 1 Vesical calculi (three times enlarged).

On February 3rd a suprapubic prostatectomy was done. On introducing the finger into the bladder the calculi were quickly located and removed (Fig. 1). Palpation of the urethral orifice verified the condition of the prostate which had been accurately determined by the cystoscope. The prostate was then shelled out very easily.

In the process of separating the growth from its bed, the finger encountered a deposit of rough calcareous material in the line of cleavage, underneath the growth. After the removal of the growth, it was found that the bottom of the cavity from which it was removed was lined with this hard, gritty material, the exact nature of which was not at first clear. I had never met with a similar condition before. The sensation was very like that of palpating the inside of a chicken's craw. With the finger some of this material was detached and removed for examination. It was then apparent that

we had a collection of prostatic calculi which formed a layer posteriorly, between the adenomatous prostate and its surgical capsule. The removal of these calculi was slow and tedious. They were scraped loose with the finger, dislodged and removed by the finger and by irrigation until no more could be felt. Ninety-four calculi were in this way removed, but a great many more were lost in the gauze sponges during removal.

After the cavity had been completely freed of the calculi it was packed firmly with two long strips of plain gauze about a soft catheter passed into the bladder through the urethra. The ends of these two strips were brought out of the suprapubic wound. A rubber drainage tube was placed in the bladder and this opening closed about the drainage tube and the gauze strips. There was relatively little hemorrhage during the operation despite the fact that it was somewhat prolonged by the unusual complication referred to. Convalescence has been smooth and uninterrupted.

The calculi (see Fig. 2) vary in size from that of a millet seed to that of a pea. They are light brown or amber in color. The small ones have a smooth, polished surface and are generally spherical in outline. Many of them have been distorted by pressure from the surrounding calculi and practically all of them show one or more facets. A few of the larger specimens show a composite structure, as though formed by the fusion of several small stones. The fusion is incomplete and the outline is markedly irregular. In these specimens the individual tubercles are rounded and the surface smooth and polished. They are made up of oxalate and phosphate of lime.

The prostate was removed in one piece. It is a typical bilateral hypertrophy of the benign adenomatous type and of large volume. Incisions made into various portions of the gland failed to show any calculi.

It is to be noted that the calculi were intraprostatic, buried deep within the gland and therefore having no connection with the urethra; they were collected into a mass, or layer of stones lying in the line of cleavage, posteriorly between the enlargement and the surgical capsule. They were not present in the hypertrophied portion. Their location just beneath the capsule posteriorly and entirely outside the adenomatous growth makes it appear most probable that they formed in that part of the prostate posterior to the group of glands involved in the enlargement. As the growth proceeded the tissue was flattened out by pressure against the true fibrous capsule, and the calculi contained within the gland acini came to lie between the advancing adenoma and the surgical capsule (formed by the true fibrous capsule, plus the remnant of prostatic tissue atrophied by pressure).

It is probable that the two conditions, the calculi and the hypertrophy, developed quite independently of each other. It is most likely that the prostate already contained numerous calculi when the adenomatous changes began, and that the latter developed entirely independently of the former.

The presence of the stones in the prostate was not suspected before operation. They produced absolutely no symptoms. The only thing in the examination to attract attention was the extreme hardness of the left lobe felt per rectum. No crepitation was noticed. The extreme induration raised a suspicion of malignancy, but there was no evidence of this from the cystoscopic examination and the induration was definitely localized in the left lobe. The explanation of this extreme degree of induration was not clear before operation. It was undoubtedly due to the presence of the stones. In the very few cases I find recorded in which calculi and hypertrophy were associated, the stones were scattered throughout the gland. In no case were they collected between the adenomatous growth and the capsule. In *Zeitschrift für Urologie* (Bd. III, Heft 5, 1909, page 423), Cholzoff reports a case of hypertrophied prostate associated with multiple prostatic calculi. His patient, aged 68 years, had complained of trouble in urination for twenty-five years. Rectal examination showed a prostate considerably enlarged and firmer than usual, and the bladder free from stones (cystoscopy not allowed). Three years later small nodules were felt in the prostate, which gave slight crepitation on deep pressure. A stone was felt in the bladder with a searcher. Perineal prostatectomy was done; a single stone was found in the bladder. The prostate was very adherent and had to be cut away piece by piece. Calculi were found scattered through the gland tissue singly and grouped together. Parts of the gland were free from calculi. In all, 130 of these stones were recovered, and some were lost during the operation. They were very similar in size and color to those found in our case.

In Lund's first case (*Boston Med. and Surg. Journal*, 1911, p. 170) the prostate was very hard and nodular per rectum and showed little intravesical projection. Perineal operation was very difficult on account of adhesions. Numerous small black concretions were found within the gland tissue. The probable diagnosis before operation was carcinoma. Lund states that until very recently he had not met with this condition, although his experience in prostatic surgery has been extensive. In the paper referred to he reports three cases, none of which, however, are quite similar to ours.

Prostatic calculi are rare. Relatively few cases are reported. This may be due in part, at least, to

the difficulty in diagnosis, many cases being unrecognized. But it is to be noted that while the number of operations upon the prostate has tremendously increased in the past few years, still the number of reported cases of prostatic calculi remains very small. We have to distinguish two varieties of calculi designated prostatic: (1) Prostatic calculi in the strict sense, that is, intraglandular, and (2) calculi occurring in the prostatic urethra. To these might also be added a third class, including the calcareous deposits which sometimes occur in diseases of the prostate, for example, tuberculosis. It is not only incorrect to include these three varieties under the term prostatic calculi, but it leads to confusion in the literature. The term prostatic should be reserved for the first variety only. These form within the gland itself and have nothing in common with the other varieties. Calculi occurring in the prostatic urethra are urinary calculi and should be so designated. The majority of these form at a higher level and only reach the prostatic urethra secondarily, where further progress is arrested and further growth takes place. Under exceptional conditions a stone may form primarily in the prostatic urethra. Such a stone is designated properly as an autochthonous urethral calculus. I have reported one case of this kind. While urinary calculi occurring in the prostatic urethra—usually secondary to vesical calculi—are not uncommon, true prostatic calculi, on the other hand, are quite rare, as a perusal of the literature will show.

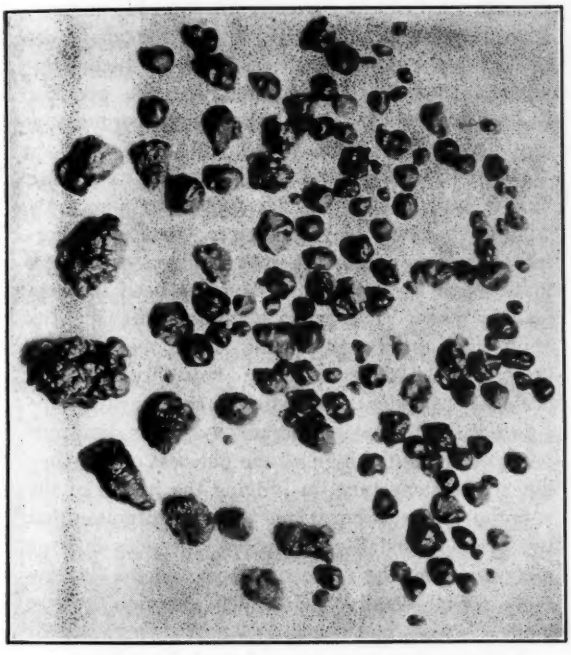

Fig. 2. Prostatic calculi (enlarged about three diameters).

They are usually multiple and of small size, the smallest ones being so minute as to be just visible; the largest ones are rarely larger than a pea. They are brown to black in color and facetted. The number of stones varies widely (Gooch 16, Golding-Bird 130, Cholzoff 130). In my case, 142 stones were recovered, while many more were lost during the operation. They apparently develop within the acini of the prostate glands upon a nucleus supplied by the corpora anylacea. They are composed chiefly of oxalate and phosphate of lime.

SOME FACTORS INFLUENCING THE MORTALITY OF SUPRAPUBIC PROSTATECTOMY.

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It is no purpose of this paper to discuss the relative merits of the two operations employed in prostatic hypertrophy, for, although each has its distinctive advantages which should be given consideration at the time of choosing the method to be pursued, yet, in a general way it may be said that the surgeon will select that one with which he feels best acquainted, even though it may not be best adapted to the case in hand.

Whilst the essential remarks of this paper apply to prostatic surgery in general, yet it is believed that they will be of special interest to those of the profession who are now resorting to suprapubic prostatectomy more generally. The pendulum which has long hovered over the perineal route, specially in America, is surely swinging to the suprapubic method, a route particularly popular with the younger school of urinary surgeons who, quite likely, have been influenced in this direction by contact with English and continental surgeons, more especially the former. This increasing popularity of the higher route necessarily gives an added importance to factors that undoubtedly have a bearing on its mortality—the *raison d'etre* of this short paper.

In regarding the mortality of the suprapubic operation, one cannot but stop and ponder over the vast difference in statistics offered by leading urolo-

gists. When one knows that an extraordinarily wide gap may be found between the figures of one surgeon and those of another, one cannot but believe that the less fortunate man is doing his work under less favorable circumstances than his contemporary, and yet, in this day of generally and evenly spread knowledge of technic, these "less favorable circumstances" are not likely to be found in deviations from the ordinary and widely practiced surgical precepts of a general character, so they must be sought for elsewhere. I feel confident they are to be found in an unconscious neglect of certain details, mayhap insignificant in themselves but of a noteworthy influence on the general success of suprapubic prostatectomy.

Sometime ago I read a paper by a surgeon with an obvious leaning toward urology, in which was given the history of a prostatic who had been suffering from chronic retention with overflow, and whose bladder formed a tumor reaching up to within a short distance of the umbilicus. The interesting feature of the history was the surgeon's temerity, undoubtedly bred in under appreciation of the grave danger attending the procedure, in completely emptying the bladder at one *séance*.

The chronically distended bladder should never be evacuated at one sitting. Unconscious violation of this surgical axiom throws undeserved odium on the operation of prostatectomy by swelling its mortality records. In chronic distention with resulting back pressure extending clear up to the kidneys, the renal function, of course, is being carried on under marked pressure changes. This increase in pressure has been of gradual progress, fortunately so gradual that the kidneys, drawing upon the reserve power of function with which they are endowed, have quite easily kept pace with the imposed hardship. Grossly speaking, the new burden has not seriously impaired the renal function. Seeing no evidence of the imminence of functional failure and with no suspicion of the renal storm that may soon break forth, the surgeon introduces a catheter and forthwith empties the bladder. A fulminating pyelonephritis or total renal failure is the not remote danger which may quickly follow the injudicious procedure. A more insidious happening is wavering of the renal powers, the anesthetic and shock of operation quickly causing total suppression of the urinary secretion.

To eliminate this element of danger so far as possible and reduce its bearing on prostatectomy's mortality, slow drainage, *per urethram*, must be employed. Slowly draining off the vesical contents, the outflow carefully regulated so that it is but slightly in excess of the renal excretion, the entire procedure extending over a period of 72 hours, the kidneys are guarded against an abrupt reduction of the abnormal intrarenal pressure, to which they have adjusted themselves, and the patient becomes a far better subject for operative work.

The surgeon's ability to judge with preciseness the every diagnostic as well as prognostic point in connection with enlargement of the prostate, presupposes a well-grounded knowledge of every aid employed in our department of surgery, for only through such can he correctly interpret his findings. In influencing general end results, the above described quality is unquestionably of far higher importance than surgical technic, for the operator is enabled with it to keep highly dangerous surgical risks off the table.

All of this may sound trite, but when experience has taught us what a leading rôle an apparently trivial detail may play in a given operation's mortality, then any factor exerting a direct or indirect influence on its results must be given heed and kept well in mind. The principal indictment which its opponents bring against the suprapubic route is that it has a higher rate of mortality than the perineal operation. This is quite true—at this time I do not wish to weigh the advantages or disadvantages of either the high or the perineal operation—but at the same time, in judging the merits of the suprapubic operation, it must not be forgotten that this greater mortality undoubtedly depends in large measure upon the neglect of some of the "apparently trivial details" of which mention is here made.

A thorough pre-operative knowledge of the size and condition of the prostate, as well as of the state of the bladder, is absolutely essential to best results, and the man who lacks the training to secure for himself this knowledge had better let the prostatic alone. The information gained through cystoscopic examination of the bladder is of the utmost service in determining the propriety as well as feasibility of operation. I want to linger at this point long enough to say that while the trained finger can secure much valuable information regarding the gland, yet it is far from being the exact instrument of diagnosis the cystoscope is. Although the cystoscope may traumatize, and even occasion a cystitis, it should be made a routine practice to employ it, for the information gained through it outweighs any drawbacks that may be held against it, and furthermore, the disadvantages which many charge against the instrument are more properly attributable to lack of deftness and cleanliness than to its actual mechanical presence.

Examination of the bladder will guard us from operating on those cases offering gross symptoms of hypertrophy, but which, however, present no evidence of intravesical projection, but on the contrary show a prostatic bar, or a collar-like growth, both of which may be more satisfactorily treated by means of the "punch" operation. It is the surgeon who is fortified with the ability to make an exact diagnosis of bladder difficulty, who is saved from the disconcerting experience of opening a bladder to remove an hypertrophied prostate which is not hypertrophied but which he feels impelled to attempt enucleate since he has already exposed it. It is clear that if, in a case of this character, it is a reckless operator who is at work in the bladder, serious damage may easily be done, and if force is used in the manipulations, this damage may even include tearing of the rectal wall. Such cases do not reduce the death-rate of the operation.

As being further illustrative of the important part played by a cystoscopic examination in determining the advisability of operation, I recall a case I had the privilege of examining quite recently. The patient, who was in his early sixties, came in from the country for a prostatectomy. The attending physician had already made a diagnosis of hypertrophy, reaching this conclusion from the patient's recital of his urinary difficulty and also by reason of an apparent increase in the gland's size when felt *per rectum*. Upon cystoscopy a large, brawny mass, ulcerated in spots, was seen behind the right ureteric orifice. It was easily apparent that it was an inoperable carcinoma, a view which became still more firmly established upon a general examination of the patient, for metastatic involvements were found, noteworthy among these being one in the tibia, the pain of which had been attributed to "rheumatism." The urgency of the vesical symptoms was due, in largest measure, to the cancer, yet at first blush the case gave the characteristic symptoms of simple adenomatous enlargement of the prostate, and it was only through cystoscopic inspection that the actual lesion was discovered and the patient saved from an unwarranted operation.

In taking up for consideration the cystitis of the prostatic we are coming to a factor which has probably as weighty a bearing on prostatectomy's death-rate as any single phase of prostatic hypertrophy under the surgeon's control.

The beneficent results that follow a preliminary cystotomy with drainage in cases of marked cystitis, are so obvious that it is a procedure which might logically be adopted in all cases of infected urine. To the fact that a large proportion of prostatics have lived a catheter life before applying for operation and have been guilty of the usual lay disregard for asepsis, may be attributed most of the virulent infections of the bladder, yet even those who are not reduced to the extremity of catheterism are frequently found to be suffering from a severe grade of cystitis due to stones or urinary stagnation.

To remove the prostate in the presence of a marked cystitis is a frank token of bad judgment, particularly so when a preliminary cystotomy, by affording free drainage to the infected bladder and permitting lavage, would in a week add materially to the patient's chances for withstanding the severer operation. It is surprising how quickly improvement manifests itself in the cystitis, as well as in the general state of the patient, even though he be septic from absorption of the toxic material, when subjected to the simple procedure of a cystotomy. Since in these cases the kidneys are not always exempt from participation in the infectious processes, the operation of cystotomy serves the further purpose of aiding the renal function by rendering less noxious the source of the kidney infection. With the infectious influence thus diverted, the kidneys are not slow to manifest, by an increase in their functional capacity, their relief at the withdrawal of the burden which has been imposed upon them. The ascent of the nitrogenous waste index and the quicker elimination of the color test products mutely attest to the value of this procedure.

Cystotomy is simple and may easily be performed under local anesthesia. In a week's time the bladder may be entered through the first incision and the gland enucleated. Just as is advisable in the one-stage operation, the edges of the vesical wound should be stitched to the abdominal muscles, so as to guard against infecting the prevesical space; a good-sized drainage tube, say three-quarters of an inch in diameter, is inserted and the bladder is washed out several times daily. The gratifying response shown by prostatics with dirty bladders, even to the point of sepsis and pyelitic involvement, when subjected to preliminary cystotomy, is one of the delights of surgery and seems to be sufficient warrant for not only performing the step in the presence of cystitis and pyelitis, but even for suggesting its advisability as a routine measure in every case exhibiting even the mildest vesical infection. A wider employment of this plan would undoubtedly lend much aid in the reduction of prostatectomy's death-rate.

In the enucleation of the gland an important feature relates to the finding of the proper line of cleavage. The finger should stay within the sheath of the gland formed by the recto-vesical fascia, and

should proceed in a line of the slightest resistance if a minimum of damage to adjacent tissues is to be done. Carried out in this manner, injury of the prostatic plexus of veins need not be feared and hemorrhage is of little import. Otherwise, however, startling hemorrhage may be a feature of the operation.

A few words concerning drainage. I cannot believe that the plan followed by some continental surgeons of closing the suprapubic wound in what might be termed clean cases, is a wise one, notwithstanding that they continue to advise the practice. Granting that the case is a clean one, a catheter introduced through the urethra is not sufficient to take care of clots which may easily form, and the retention of which might give rise to trouble. It is desirable to protect the prevesical space against contamination and infection, and toward this end the vesical and abdominal walls should be sewn together, by which means the possibility of leakage into this space during the early hours after the operation is largely reduced.

I am partial to the large suprapubic tube. Although I well remember that during the early days of my connection with St. Peter's Hospital in London, I rather marveled at the seven-eighths inch tubing employed by Freyer, Thomson Walker and others of the staff, it was not long before the advantages offered by such a large caliber became quite obvious. Except in atony of its walls, the bladder clutches the tube tightly, its large bore operates against plugging with coagula, and it undoubtedly expedites free drainage and early convalescence. Of course this tube should not be introduced into the prostatic cavity which, on the contrary, should be left to contract without hindrance. The large tube is replaced on the fourth day with a smaller one and this one is withdrawn six or seven days later.

It cannot but be believed that these details, nonessentials though they may seem, are of large importance in determining the results of suprapubic prostatectomy, and this fact seems ample justification for their repetition in this publication. Much more might have been said, but then the subject of prostatectomy would have had to be discussed much more extensively and that would have been beyond the ambition of this paper.

When you find acutely inflamed areas arising spontaneously in the legs of persons with varicose veins, think of thrombophlebitis.—Bernays' Golden Rules of Surgery.

BRIEF NOTES IN PROSTATIC SURGERY.

1. ON THE EMPLOYMENT OF PACKINGS TO PREVENT HEMORRHAGE AFTER SUPRAPUBIC PROSTATECTOMY.
2. ON THE ADMISSIBILITY OF MASSAGE IN ACUTE SUPPURATIVE PROSTATITIS.
3. AN ADDITION TO THE DIAGNOSTICS OF CALCULOUS PROSTATITIS.

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1. *The Employment of Packings to Prevent Hemorrhage after Suprapubic Prostatectomy.*

Probably most surgeons who practice suprapubic prostatectomy introduce one or two gauze packings into the prostatic pouch to control bleeding; but some of them, following Freyer, employ no hemostasis other than by a hot irrigation.

Single experiences often determine a surgeon in one or another method or detail of technique. A single, almost tragic, experience has determined me always to insert a very careful tamponade after suprapubic prostatectomy:

—— Smith, a tall, vigorous and robust cardriver, was referred by Dr. Adolph Schoen to my service in the Philanthropin Hosiptal in May, 1912, suffering with vesical calculi, cystitis and a very large, obstructing prostate. I removed three calculi suprapubically. Twelve days later, when the cystitis had abated and the wound was granulating, I enucleated the adenomatous prostate through the same opening. Nitrous oxide narcosis was employed, which may have contributed to the later development (?). After irrigation with a hot saline solution, two gauze packings were introduced into the prostatic cavity, and when the patient was taken from the operating table all bleeding had apparently ceased and his general condition was excellent. Less than an hour later, when I was finishing another operation, a nurse reported to me that Mr. Smith's pulse had become very weak and his dressings were soaked with blood. He was, indeed, almost exsanguinated. After removing an astonishing quantity of clotted blood from the bladder, manually and by irrigation, I tamponned the prostatic wound and the bladder itself very thoroughly and applied a sand-bag over the dressing. Thereafter there was no bleeding, and the patient made a good recovery.

II. *The Occasional Admissibility of Massage in Acute Suppurative Prostatitis.*

We are accustomed to regard prostatic massage as a treatment suited only for chronic and residual conditions; and the rule is a wise one to avoid manipulation of the organ when it is acutely inflamed (indeed, I have seen an epididymitis develop immediately after a too vigorous rectal palpation of the prostate). But like many other rules, this one should sometimes be ignored.

In 1908 I treated a young man for an acute posterior urethritis and prostato-cystitis—his first gonorrheal infection. He had fever, pain on defecation, and marked vesical tenesmus, was obliged to urinate every few minutes, and his urine was uniformly purulent throughout. Daily irrigations of the urethra and bladder, continued for nearly two weeks, effected scant improvement in the symptoms or in the appearance of the urine. I was about to institute more frequent irrigations when it occurred to me to try, first, the effect of gently expressing the contents of the soft, abnormally sensitive prostate. The first massage, cautiously undertaken, evacuated a large amount of brownish-yellow pus, and was followed by an immediate marked improvement in the subjective symptoms. After a few daily massages, the pain, tenesmus and fever ceased entirely; at the end of a week, micturition was at three-hourly intervals and only twice at night, the second portion of the urine was clear and albumin-free, and the pus expressed from the now much less sensitive prostate was scantier and thinner. The patient made a complete recovery, symptomically and bacteriologically, and in the five years that have since elapsed he has had no signs of recurrence.

Here, then, is a case of acute, gonorrheal, suppurative prostatitis, in which massage not only promptly relieved the distressing symptoms but also, probably, saved the patient from the development of a prostatic abscess.

"If, then, in most cases of acute gonorrheal prostatitis a single massage may be followed by disastrous results, and in a few cases massage is the treatment that should be employed, how are these latter to be recognized? To set up, as nearly as possible, a specific indication: if in a case of gonorrheal urethritis there develop symptoms of prostatitis or (and) cystitis (for in these cases the sometimes uniformly turbid urine gives the impression of a cystitis) and if frequent irrigation of the bladder and urethra does not effect a clearing of the urine and diminution in the frequency of micturition, insert the finger into the rectum and gently compress (slightly massaging) the prostate —selecting, if there be such, the most prominent or softest area. If pus then escapes from the urethra the indication for massage is established.

"Massage in these cases is scarcely more painful than is massage of the non-infected gland. Nevertheless, it should be conducted with great gentleness at first; as the tolerance of the gland is learned greater force may be used, if needed. This massage should be performed daily, and followed by irrigation. If the pus is considerable in amount (and it is apt to be), and reaccumulates rapidly, two treatments a day may be desirable for a short time. Within a week the amount of pus expressed will be markedly diminished, the urine will be much clearer and the subjective symptoms will have subsided. In two to four weeks—the massage meanwhile at longer intervals—no pus will be seen in the prostatic fluid expressed and, under continued treatment, gonococci and pus cells disappear.

"We are prepared for the criticism that these cases would get well under the usually employed conservative treatment by recumbency, internal medication, etc.; and we are equally prepared to dispute it. Indeed, we are satisfied that this type of prostatitis (in which the acini are probably loaded with pus and in which perhaps minute abscesses have also formed), unless managed by massage, passes on to the development of an abscess.—W. M. B." *

III. *An Addition to the Diagnostics of Calculous Prostatitis.*

I have elsewhere recorded,** with illustrative cases, two data diagnostic of prostatic calculi, and since the symptology of this condition is scant and dealt with meagerly in our text-books and monographs, I would repeat them in this connection. One of these data is a simple physical deduction, and the other is an almost equally obvious clinical observation.

1. If a radiograph of the *unemptied* bladder, exposed with the patient in the level supine or reversed Trendelenburg position, shows a shadow or group of shadows in the region of the neck of the bladder, and a second radiograph, exposed with the patient in the Trendelenburg position and the *x*-rays passing in the same relative direction, shows the shadow in the same place as before, the stone or stones are fixed in the prostate or the prostatic urethra or in a diverticulum behind the prostate.

I suggest to radiographists this technique in order to differentiate vesical from prostatic calculi.

2. The absence, for a long period of time, of all signs of local infection in a case of purulent prostatitis, is strongly suggestive of a calculous etiology.

30 WEST 92ND STREET.

* Editorial, American Journal of Surgery, May, 1911.
** Medical Review of Reviews, February, 1913.

Always remember that any chronic ulcer with hard, tight, indurated edge can never heal until the edge is either loosened or removed.—Bernays' Golden Rules of Surgery.

American Journal of Surgery

PUBLISHED BY THE

SURGERY PUBLISHING CO.

J. MacDONALD, Jr., M.D., President and Treasurer

92 William St., N. Y., U. S. A.

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, APRIL, 1913.

SOME THOUGHTS SUGGESTED BY OUR PROGRESS IN UROLOGIC SURGERY.

One need but compare the contributed articles in this issue of the AMERICAN JOURNAL OF SURGERY with those on similar subjects published scarcely more than fifteen years ago (when the tentative diagnosis of a stone in the kidney or ureter submitted the patient to an extensive, sometimes mutilating and often fruitless exploratory operation), to be impressed, if he had not been already impressed, with the evolution—nay, revolution, that has taken place in urology. No special field better writes the story of the development of medicine from dogmatism, through empiricism, to scientific demonstration.

As in other departments, the greatest advances in diagnosis have been by methods determining lesions by visual evidence (microscopy, ophthalmoscopy, exploratory laparatomy), so, too, urology has been established in diagnostic exactness by two great visualizing procedures—radiography and cystoscopy. They have replaced guessing with seeing, speculation with demonstration.

Reflecting upon the wonders worked by the gift to medicine of von Roentgen, the physicist, we call to mind those other contributions to our daily service made by non-medical men—Garcia, who introduced the laryngeal mirror; von Helmholt, who devised the ophthalmoscope; and, greatest of all, Pasteur, whose epochal discoveries support the entire structure of modern medicine.

Indeed, medicine has never been the exclusive property or interest of physicians, and it is less so to-day than ever. Chemists, psychologists, biologists are bending their energies more and more to those problems that directly concern human life and health. But, especially, there has been growing up more around than among us, a small army of sociologists who have seized upon and developed the larger aspects of preventive medicine and hygiene. In this great sphere of social medicine and medical sociology are we physicians, in the lead, as we should be? Or is it true, as it has been several times asserted, that, with some exceptions, we are merely trailing along—behind?—W. M. B.

JOHN SHAW BILLINGS.

We know of no man in medical history who has builded as great a tangible monument to his memory as Dr. John Shaw Billings, the illustrious Director of the New York Public Library, retired Lieut.-Colonel, U. S. Army, who died of pneumonia on March 11th at the age of 73. To his genius the world owes its greatest medical library—that of the Surgeon General of the U. S. Army at Washington.

Surgical Suggestions

Crinoline gauze provides a better body for plaster bandages than soft gauze. The plaster should be spread evenly into the meshes.

To be most serviceable a plaster bandage should be very loosely rolled. It may be kept air-tight in gutta-percha sealed with chloroform.

Friar's balsam (tinct. benzoin comp.), to be reapplied from time to time, forms a protective film quite useful for wounds of the mucous membranes (as after operations in the mouth or anus) and for other moist surfaces, e. g., cracked nipples.

If a sepsis of unknown origin is associated with a positive blood culture, don't fail to examine the ears. Sinus involvement from otitis media may be present with little objective evidence and no other symptoms than fever and chills.